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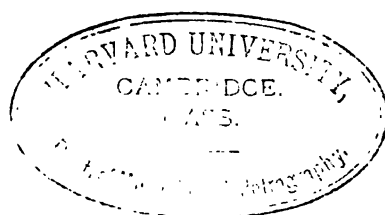
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Department of
Mineralogy & Petrography
HARVARD UNIVERSITY
Cambridge, MASS.



TWENTY-FIRST ANNUAL REPORT
OF THE
UNITED STATES GEOLOGICAL SURVEY
TO THE
SECRETARY OF THE INTERIOR
1899-1900

CHARLES D. WALCOTT
DIRECTOR

IN SEVEN PARTS

PART VI—MINERAL RESOURCES OF THE UNITED STATES, 1899
METALLIC PRODUCTS, COAL, AND COKE

DAVID T. DAY, CHIEF OF DIVISION

WASHINGTON
GOVERNMENT PRINTING OFFICE
1901

TWENTY-FIRST ANNUAL REPORT
OF THE
UNITED STATES GEOLOGICAL SURVEY

PART VI—MINERAL RESOURCES OF THE UNITED STATES, 1899
METALLIC PRODUCTS, COAL, AND COKE



THE TWENTY-THIRD ANNUAL REPORT

OF THE BOARD OF DIRECTORS

OF THE AMERICAN RED CROSS

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF MINING AND MINERAL RESOURCES,
Washington, D. C., February 23, 1901.

SIR: I have the honor to transmit the sixteenth annual report on the mineral resources of the United States. It bears the title Mineral Resources of the United States, 1899. As usual, it carries the statistical record of the mineral development of this country to the end of the calendar year concerned, in this case to December 31, 1899, and contains in addition much descriptive matter collected while the statistical canvass was being finished. Practically all of the matter has found prompt publication in accordance with the law providing for the printing of each chapter as soon as completed.

In accordance with your instructions, the report for the calendar year 1900 is in preparation.

Very respectfully, your obedient servant,

DAVID T. DAY,
Geologist in Charge.

Hon. CHARLES D. WALCOTT,
Director, United States Geological Survey.

MINERAL RESOURCES OF THE UNITED STATES, 1899.

DAVID T. DAY, *Chief of Division.*

INTRODUCTION.

The arrangement and scope of this volume are practically the same as in the fifteen volumes of the series, *Mineral Resources of the United States*, which have preceded it. The object of the volume is to record the developments in the mineral industries of the United States since the last report. The reports should be consulted together. Every chapter treated in this report is a census of the productive features of the industry as complete as possible with the means at disposal. The statistics of the production of gold and silver, as usual, are the work of the Director of the Mint, Treasury Department, and are accepted as official. The statistics of the imports and exports of minerals, which form an essential part of the volume, are obtained through the courtesy of the Chief of the Bureau of Statistics, Treasury Department.

The totals given below will be found to differ somewhat from those published on the chart showing the mineral products of the United States from 1890 to 1899. This is caused by the receipt of revised figures from special agents in charge of the statistics of some of the more important minerals.

ACKNOWLEDGMENTS.

Except as noted above and in a few isolated instances where some other well-established agency already exists by which the statistics are collected accurately, the figures are obtained direct from the producers, and it is impossible to acknowledge here, otherwise than by brief mention, the invaluable assistance which has been freely rendered by them and the voluntary contributions of many local experts. The names of the statistical experts who, acting under the authority of the United States, have collected statistics from the producers are given at the heads of the special chapters. The technical press, besides

affording much information concerning new mining enterprises, has been largely drawn upon for prices, market reports, and new technical processes.

As heretofore, the publication of this volume has been anticipated to a great extent by the issuance in advance, in pamphlet form, of the several chapters which compose it. Before the issuance of this volume all of the chapters, except a few of the minor minerals, will have been so given to the public.

The following summary gives the principal statistical information in this report.

In presenting these statistics unnecessary duplication has been avoided. The coke product discussed in the following pages, amounting to over 19,000,000 short tons, with a value of approximately \$34,000,000, is excluded from the tabulation, as the quantity and value of the coal used in its manufacture is included in the statistics of coal production. Similarly, white lead, red lead, and litharge, whose average aggregate value for the past ten years has exceeded \$10,000,000, are not given in the table, the base from which they are made being included in the output of pig lead. Zinc oxide or zinc white, made direct from the ores and consequently not included in spelter production, is tabulated. The product of pig iron and its value are given in the tabulation as the best means of presenting the statistics of production in the first marketable condition. The value of brick and pottery clays rather than the value of the manufactured products is embraced in the tabular statement, although the statistics of brick, tile, and pottery production are presented in detail in the report. Inflation of valuation and all unnecessary duplication are thus avoided.

SUMMARY OF THE MINERAL PRODUCTION OF THE UNITED STATES IN 1899.

GENERAL REMARKS.

Owing to the great variety in the units of measurement the only factor common to all mineral products and the only means by which the totals can be expressed is the value. The figures given in the following summary show the remarkable activity in the mineral industries of the United States, in common with other industries, during the year under review—1899. The total value of our mineral products in that year was the enormous sum of \$972,560,093, as compared with a grand total of \$697,817,581 in 1898, a gain of \$274,742,512, or 39.37 per cent. The largest gain in any year since 1880, except that of 1899 over 1898, was in 1895, when the product increased \$94,634,861, or 17.97 per cent. The next greatest increase was that of 1887 over 1886, when it was \$74,927,880, or 16.81 per cent. In 1890 it was \$68,641,328, or 12.46 per cent. In 1898 it was \$66,963,652, or 10.61 per cent, while it was in 1881 \$36,856,552, or 9.98 per cent.

In other years between 1880 and 1898, the gains were not noteworthy, while in some of the years, notably 1884, the product decreased \$40,451,968, or nearly 9 per cent. During the industrial depression of 1892–1895 the product would have been expected to decline, which it did, going from \$648,675,081 in 1892 to \$574,299,886 in 1893 and \$526,624,139 in 1894 and \$621,259,000 in 1895, not reaching the output of 1892 until 1898.

While the normal rate of increase in the mineral products of the United States from 1880 to 1898 was in the neighborhood of \$25,000,000, the enormous gain of \$274,742,512 in 1899 over 1898 only serves to emphasize the great demand for mineral products and the consequent increase in value of the product, for while the value increased over 39 per cent the output of the mines probably did not increase much more than 10 per cent.

As will be noted from the summary, nearly every important mineral participated in this increase, and while the production of some of the leading minerals, such as pig iron, increased only slightly in quantity, and while lead showed an actual decline, still the extraordinarily high prices ruling in the mineral markets produced the great increase

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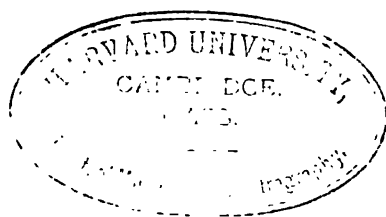
CHARLES D. WALCOTT
DIRECTOR

IN SEVEN PARTS

PART VI—MINERAL RESOURCES OF THE UNITED STATES, 1899
METALLIC PRODUCTS, COAL, AND COKE

DAVID T. DAY, CHIEF OF DIVISION

WASHINGTON
GOVERNMENT PRINTING OFFICE
1901



New York and Michigan, amounted to 19,708,614 barrels of 280 pounds net. This was an increase of 2,095,980 barrels, or about 12 per cent, over the product in 1898, which was in turn the largest output up to that time. The value of the product in 1899 increased slightly less than its amount, and amounted to \$6,867,467, which was a gain of 10.5 per cent over 1898. The large amount of salt in brine used at chemical works, and upon which a lower value is placed than on either evaporated or rock salt, is responsible for the comparatively less increase in the value. The principal feature of interest connected with the salt industry in 1899 was the securing of the control of a large number of producing plants by a few concerns whose interests are supposed to be allied. The principal producing plants in the Warsaw district, New York, have been combined under one management. A number of Michigan works have also combined under one management, as have the larger plants in the vicinity of Hutchinson, Kans.; Salt Lake City, Utah, and along Alameda Bay, in California. Several Ohio plants, formerly independent, have also been absorbed by combined interests.

Sulphur.—The mines of Louisiana, which were idle in 1897 and 1898, resumed operations in 1899; and some sulphur was also produced in Nevada and Utah. The total product amounted to 4,830 short tons, valued at \$107,500, against 1,200 short tons, valued at \$32,960, in 1898.

PIGMENTS.

Barytes.—The production of barytes, or heavy spar, used as a substitute for or adulterant in white lead, was the largest in our history and amounted to 41,894 short tons, valued at \$139,528, against 31,306 short tons, valued at \$108,339, in 1898. The year of previous largest production was 1892, when the amount was 32,108 short tons.

Cobalt oxide.—The production increased from 6,247 pounds in 1898, worth \$9,371, to 10,230 pounds in 1899, worth \$18,512, which exceeds the product of 1896, but does not equal that of 1897, when it reached its maximum of 19,520 pounds, valued at \$31,232.

Metallic paint.—Exclusive of mortar color, the amount of iron ore ground for pigment in 1899 was 23,423 short tons, a gain of 2,451 short tons over 1898, when the product amounted to 20,972 short tons. The value of the product decreased \$14,034, it being \$263,979 in 1898 and \$249,945 in 1899.

Ocher, umber, and sienna.—The production of ocher in 1899 amounted to 14,124 short tons, valued at \$140,168, as against 11,963 short tons, valued at \$123,832, in 1898. The production of umber decreased from 537 short tons in 1898 to 473 short tons in 1899, and the production of sienna decreased from 689 short tons to 588 short tons, with proportionate decrease in value.

Venetian red.—The production of this pigment increased from 10,271 short tons, valued at \$160,711, in 1898 to 11,991 short tons, valued at \$210,361, in 1899.

White lead, red lead, litharge, and orange mineral.—The production of all lead pigments showed substantial increases in 1899. The output of white lead in oil increased from 153,036,302 pounds to 170,214,565 pounds; dry white lead increased from 39,058,581 pounds to 50,178,486 pounds. Red-lead production rose from 18,435,016 pounds to 22,157,694 pounds; litharge from 18,176,591 pounds to 21,937,704 pounds, and orange mineral from 1,462,715 pounds to 2,024,302 pounds. Values increased in satisfactory proportion. In each case the figures for 1899 were the maximum.

Zinc white.—The consumption of zinc oxide as a basis for white and colored pigments continues to increase, the amount of this material produced in 1899 being 40,146 short tons, valued at \$3,211,680, against 33,000 tons in 1898, valued at \$2,310,000.

MISCELLANEOUS.

Asbestos.—As for several years, the output of this mineral came from two States—California and Georgia. The total product in 1899 amounted to 681 short tons, worth, crude at the mines, \$11,740, an increase from a product of 605 tons, worth \$10,300, in 1898, and with one exception the largest output both in amount and value within the last fifteen years.

Asphaltum.—This title includes the numerous varieties of bitumens or hydrocarbons occurring in the United States, and not discussed in the chapter on petroleum. The total product of these minerals in 1899 was 75,085 short tons, valued at \$553,904, as compared with 76,337 in 1898, worth \$675,649, a decrease of 1,252 tons and \$121,745. This is the smallest product and value since 1896.

Bauxite.—The production of this ore of aluminum continues to increase, rising from 25,149 long tons in 1898 to 35,280 long tons in 1899. The value of the product increased from \$75,437 in 1898 to \$125,598 in 1899.

Feldspar.—This product, whose principal use is in the pottery industry, more than kept pace with the great increase in the flint product, the output increasing from 13,440 short tons in 1898, valued at \$32,395, to 27,202 tons, valued at \$238,545 in 1899, being a gain of 13,762 tons in output and \$206,150 in value, or 636.36 per cent in the value of the output.

Fibrous talc.—The production of this mineral increased from 54,356 short tons in 1898, valued at \$411,430, to 54,655 tons in 1899, worth \$438,150. With the exception of 1891 and 1892 the value of the output in 1899 was the greatest ever attained. In those years it was \$493,068 and \$472,485, respectively.

Flint.—The production of flint (quartz) in 1899 was 36,852 short tons, valued at \$229,345, as compared with 21,426 short tons in 1898, worth \$42,670, a gain in production of 15,426 tons, or 72 per cent, and in value \$186,675, or 437.49 per cent. The rapid gain in this

industry has been remarkable, the rise being from \$26,227 in 1897, \$42,670 in 1898, and \$229,345 in 1899.

Fuller's earth.—This product showed a decline in 1899 from 1898, the amounts being 14,860 short tons in the earlier year, valued at \$106,500, and 12,381 short tons in the later year, valued at \$79,644.

Graphite.—The production of crystalline graphite in 1899 was 2,900,732 pounds, and of the amorphous variety 2,324 tons. The aggregate value of these products was \$167,106. The production of crystalline graphite in 1898 was 2,360,000, and of the amorphous 890 short tons. The value of both of these products in 1898 was \$75,200.

Limestone for iron flux.—This product naturally kept pace with the increased production of pig iron, and 6,707.435 long tons were used in 1899 for this purpose, valued at \$1,695,205; in 1898 the product was 5,275,819 long tons, valued at \$2,638,000. This was an increase of 1,431,616 tons, or 27.14 per cent, while the value increased \$2,057,205, or 77.98 per cent.

Magnesite.—This product was practically the same in 1898 and 1899, or 1,263 short tons in the former and 1,280 short tons in the latter year. The value of the product showed a greater difference, or \$19,075 in 1898 and \$18,480 in 1899. This product comes entirely from California.

Marls.—It is estimated that the production of marl in New Jersey for fertilizing purposes in 1899 was about the same as that in 1898, viz, 60,000 tons, valued at \$30,000.

Mica.—The mica production of the United States in 1899 consisted of 108,570 pounds of sheet mica, valued at \$70,587, and 1,505 short tons of scrap mica, worth \$30,878. The production in 1898 amounted to 129,520 pounds of sheet and 3,999 short tons of scrap, valued, respectively, at \$103,534 and \$27,564. This indicates a decrease of 20,950 pounds in the production of sheet mica in 1899 as compared with the preceding year, with a loss in value of \$32,947. The production of scrap mica was 2,494 short tons less than in 1898, a decrease of over 60 per cent, while there was an increase of \$3,314, or 12 per cent in value.

The reason for the decrease in the domestic production in 1899 may be ascribed to the large importations of foreign mica.

Mineral waters.—This industry showed an increase from 28,853,464 gallons sold in 1898 to 39,562,136 gallons in 1899, a gain of 10,708,672 gallons, or 37.11 per cent, while the value decreased from \$8,051,833 in 1898 to \$6,948,030 in 1899, a loss of \$1,103,803, or 13.71 per cent. In 1898 the average value per gallon was 27.9 cents; in 1899 it was 17.56 cents. This reduction in value is due to the fact that a number of new springs have reported with a large production at a low rate—about one-half a cent a gallon.

Monazite.—This product increased from 250,776 pounds in 1898, valued at \$13,542, to 350,000 pounds in 1899, valued at \$20,000.

Precious stones.—The value of the product increased from \$160,920 in 1898 to \$185,770 in 1899. Among the principal features of interest in the industry in 1899 may be mentioned an increase in the output of the sapphire mines of Fergus County, Montana, and the discovery of remarkably brilliant sapphires in Granite County, Montana, the continued output of turquoise in New Mexico, the development of turquoise localities in Nevada and California, a great increase in the amount of diamond cutting in the United States, and a continued search for minor gems in North Carolina, Maine, Connecticut, and other States.

Pumice stone.—This product showed a decline from 600 short tons in 1898, valued at \$13,200, to 400 tons in 1899, worth \$10,000.

Rutile.—This product showed a slight increase from 140 pounds in 1898, worth \$700, to 230 pounds in 1899, valued at \$1,030. Its principal use is as a coloring matter in artificial teeth.

Soapstone.—In 1899 the production of soapstone in the United States, 24,765 short tons, was larger than that of any preceding year, but the value, \$330,805, was considerably less than the value of the product in 1892, 1894, 1896, and 1897, when it was \$423,449, \$401,325, \$354,065, and \$365,629, respectively. While the value in 1899 was less than that of some preceding years, as just shown, nevertheless it was greater than that of 1898, when the value was \$287,112.

Mineral products of the

		1898.	
Products.		Quantity.	Value.
METALLIC.			
1	Pig iron, spot value..... long tons.	11,773,934	\$116,557,000
2	Silver, coining value..... troy ounces.	54,438,000	70,384,485
3	Gold, coining value..... do.	8,118,398	64,463,000
4	Copper, value at New York City..... pounds.	526,512,987	61,865,276
5	Lead, value at New York City..... short tons.	222,000	16,650,000
6	Zinc, value at New York City..... do.	115,399	10,385,910
7	Quicksilver, value at San Francisco..... flasks.	31,092	1,188,627
8	Aluminum, value at Pittsburg..... pounds.	5,200,000	1,716,000
9	Antimony, value at San Francisco..... short tons.	1,120	184,050
10	Nickel, value at Philadelphia..... pounds.	11,145	8,956
11	Tin..... do.	None.	
12	Platinum, value (crude) at San Francisco..... troy ounces.	225	1,913
13	Total value of metallic products.....		343,400,217
NONMETALLIC (SPOT VALUES).			
14	Bituminous coal..... short tons.	166,592,023	132,596,313
15	Pennsylvania anthracite..... long tons.	47,663,076	75,414,537
16	Natural gas.....		15,296,813
17	Petroleum..... barrels.	55,364,233	44,193,359
18	Brick clay.....		9,000,000
19	Cement..... barrels.	12,111,208	9,859,501
20	Stone.....		36,607,264
21	Corundum and emery..... short tons.	4,064	275,064
22	Garnet for abrasive purposes..... do.	2,967	86,850
23	Grindstones.....		489,769
24	Infusorial earth and tripoli..... short tons.	2,733	16,691
25	Millstones.....		25,934
26	Oilstones, etc..... pounds.		180,738
27	Borax..... do.	16,000,000	1,120,000
28	Bromine..... do.	486,979	126,614
29	Fluorspar..... short tons.	7,675	63,050
30	Gypsum..... do.	291,638	755,280
31	Marls..... do.	60,000	30,000
32	Phosphate rock..... long tons.	1,308,885	3,453,460
33	Pyrite..... do.	193,364	593,801
34	Salt..... barrels.	17,612,634	6,212,554
35	Sulphur..... short tons.	1,200	32,960
36	Barytes (crude)..... do.	31,306	108,339
37	Cobalt oxide..... pounds.	6,247	9,371
38	Mineral paints..... short tons.	58,850	694,856
39	Zinc white..... do.	33,000	2,310,000
40	Asbestos..... do.	605	10,300
41	Asphaltum..... do.	76,337	675,649
42	Bauxite..... long tons.	25,149	75,437
43	Chromic iron ore..... do.	None.	None.
44	Clay (all other than brick)..... do.		1,000,000
45	Feldspar..... short tons.	13,440	32,395
46	Fibrous talc..... do.	54,356	411,430
47	Flint..... do.	21,426	42,670
48	Fuller's earth..... do.	14,860	106,500
49	Graphite (crystalline)..... pounds.	2,360,000	75,200
50	Graphite (amorphous)..... tons.	890	
51	Limestone for iron flux..... long tons.	5,275,819	2,638,000
52	Magnesite..... short tons.	1,263	19,075
53	Manganese ore..... long tons.	15,957	129,185
54	Mica (sheets)..... pounds.	129,520	103,534
55	Mica (scrap)..... tons.	3,999	27,564
56	Mineral waters..... gallons sold.	28,853,464	8,051,833
57	Monazite..... pounds.	250,776	13,542
58	Ozocerite, refined..... pounds.	None.	None.
59	Precious stones.....		160,920
60	Pumice stone..... short tons.	600	13,200
61	Rutile..... pounds.	140	700
62	Soapstone..... short tons.	22,231	287,112
63	Total value of nonmetallic mineral products.....		353,417,364
64	Total value of metallic products.....		343,400,217
65	Estimated value of mineral products unspecified.....		1,000,000
66	Grand total.....		697,817,581

SUMMARY.

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United States in 1898 and 1899.

1899.		Increase or decrease in 1899.		Per cent of increase or decrease.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
13,620,703	\$245,172,654	+ 1,846,769	+ \$128,615,654	15.69	110.35	1
54,764,500	70,806,626	+ 326,500	+ 422,141	0.60	0.60	2
3,437,210	71,053,400	+ 318,812	+ 6,590,400	10.22	10.22	3
568,666,921	101,222,712	+42,153,934	+ 39,357,436	8.01	63.62	4
210,500	18,945,000	- 11,500	+ 2,296,000	- 5.18	+ 13.78	5
129,051	14,840,865	+ 13,652	+ 4,454,965	11.83	42.69	6
30,454	1,452,745	- 638	+ 264,118	- 2.05	+ 22.22	7
5,200,000	1,716,000					8
1,275	251,875	+ 155	+ 67,825	13.84	36.85	9
22,541	8,566	+ 11,396	+ 4,610	102.25	116.53	10
None.						11
300	1,800	+ 75	+ 113	+ 33.33	- 5.91	12
	525,472,243		+ 182,072,026		53.02	13
193,321,987	167,935,304	+26,729,964	+ 35,348,991	16.04	26.66	14
53,944,647	88,142,130	+ 6,281,571	+ 12,727,593	13.18	16.88	15
	20,024,873		+ 4,728,060		30.91	16
57,070,850	64,603,904	+ 1,706,617	+ 20,410,545	3.08	46.18	17
	11,250,000		+ 2,250,000		25.00	18
15,520,445	12,889,142	+ 3,409,237	+ 3,029,641	28.14	30.73	19
	44,713,660		+ 8,106,396		22.14	20
4,900	150,600	+ 836	+ 124,464	+ 20.57	- 45.25	21
2,765	98,325	- 202	+ 11,475	- 6.81	+ 13.21	22
	675,586		+ 185,817		37.94	23
4,334	37,032	+ 1,601	+ 20,341	58.58	121.87	24
	28,115		+ 2,181		8.41	25
	208,283		+ 27,545		15.24	26
40,714,000	1,139,882	+24,714,000	+ 19,882	154.46	1.78	27
433,004	108,251	- 53,975	+ 18,363	- 11.08	- 16.96	28
15,900	96,650	+ 8,225	+ 33,600	107.17	53.29	29
486,235	1,287,090	+ 194,597	+ 531,800	66.73	70.41	30
60,000	30,000					31
1,515,702	5,094,076	+ 206,817	+ 1,630,616	15.80	47.22	32
174,734	543,249	- 18,630	- 50,552	- 9.63	- 8.51	33
19,708,614	6,867,467	+ 2,065,980	+ 654,913	11.90	10.54	34
4,830	107,500	+ 3,630	+ 74,540	302.50	226.15	35
41,894	139,528	+ 10,588	+ 31,189	33.82	28.79	36
10,230	18,512	+ 8,983	+ 9,141	63.75	97.56	37
63,111	728,389	+ 4,261	+ 33,533	7.24	4.83	38
40,146	3,211,680	+ 7,146	+ 901,680	21.65	39.03	39
681	11,740	+ 76	+ 1,440	12.56	13.98	40
75,085	553,904	- 1,252	+ 121,745	- 1.64	- 18.02	41
35,280	125,598	+ 10,131	+ 50,161	40.29	66.49	42
None.	None.					43
	1,731,537		+ 731,537		73.15	44
27,202	238,545	- 13,762	+ 206,150	102.40	636.36	45
54,655	438,150	+ 299	+ 26,720	0.55	6.49	46
36,852	229,345	+ 15,426	+ 186,675	72.00	437.49	47
12,381	79,644	- 2,479	- 26,856	- 20.02	- 33.72	48
2,900,732	167,106	- 540,732	+ 91,906	22.91	122.22	49
2,324	4,695,205	+ 1,431,616	+ 2,057,205	161.12	77.98	50
6,707,435	18,480	+ 17	+ 596	27.14	3.12	51
1,280	82,278	- 6,022	- 46,907	+ 1.35	- 36.31	52
9,835	70,587	- 20,950	- 32,947	- 37.74	- 31.82	53
108,570	30,878	- 2,494	+ 3,314	- 16.18	+ 12.02	54
1,505	6,948,030	+10,708,672	+ 1,103,803	- 62.37	- 13.71	55
39,562,136	20,000	+ 99,224	+ 6,458	+ 37.11	47.09	56
350,000	None.			39.57		57
None.	185,770		+ 24,850		15.44	58
400	10,000	- 200	- 3,200	- 33.33	- 24.24	59
230	1,030	+ 90	+ 330	64.29	47.14	60
24,765	330,806	+ 2,534	+ 43,693	11.40	15.22	61
	446,087,850		+ 92,670,486		26.22	62
	525,472,243		+ 182,072,026		63.02	63
	1,000,000					64
	972,560,093		+ 274,742,512		39.37	65

Mineral products of the United States

Products.		1890.	
		Quantity.	Value.
METALLIC.			
1	Pig iron, value at Philadelphia long tons..	3, 375, 912	\$89, 315, 569
2	Silver, coining value..... troy ounces..	30, 320, 000	39, 200, 000
3	Gold, coining value..... do.....	1, 741, 500	36, 000, 000
4	Copper, value at New York City pounds..	60, 480, 000	11, 491, 200
5	Lead, value at New York City short tons..	97, 825	9, 782, 500
6	Zinc, value at New York City do.....	23, 239	2, 277, 432
7	Quicksilver, value at San Francisco flasks..	59, 926	1, 797, 780
8	Nickel, value at Philadelphia pounds..	329, 968	164, 984
9	Aluminum, value at Pittsburg..... do.....		
10	Antimony, value at San Francisco short tons..	50	10, 000
11	Platinum (crude), value at San Francisco, troy ounces.	100	400
12	Total value of metallic products		190, 039, 865
NONMETALLIC (SPOT VALUES).			
13	Bituminous coal..... long tons..	38, 242, 641	53, 443, 718
14	Pennsylvania anthracite do.....	25, 580, 189	42, 196, 678
15	Stone..... do.....		18, 356, 055
16	Petroleum barrels..	26, 286, 123	24, 183, 233
17	Lime..... do.....	28, 000, 000	19, 000, 000
18	Natural gas.....		
19	Cement..... barrels..	2, 072, 943	1, 852, 707
20	Salt..... do.....	5, 961, 060	4, 829, 566
21	Phosphate rock..... long tons..	211, 377	1, 123, 823
22	Limestone for iron flux do.....	4, 500, 000	3, 800, 000
23	Mineral waters gallons sold..	2, 000, 000	500, 000
24	Zinc white..... short tons..	10, 107	763, 738
25	Potters' clay..... long tons..	25, 783	200, 457
26	Mineral paints short tons..	3, 604	135, 840
27	Borax..... pounds..	3, 692, 443	277, 233
28	Gypsum..... short tons..	90, 000	400, 000
29	Grindstones.....		500, 000
30	Fibrous talc..... short tons..	4, 210	54, 730
31	Pyrites..... long tons..	2, 000	5, 000
32	Soapstone..... short tons..	8, 441	66, 665
33	Manganese ore..... long tons..	5, 761	86, 415
34	Asphaltum..... short tons..	444	4, 440
35	Precious stones.....		100, 000
36	Bromine..... pounds..	404, 690	114, 752
37	Corundum..... short tons..	1, 044	29, 280
38	Barytes (crude)..... do.....	20, 000	80, 000
39	Graphite..... pounds..		49, 800
40	Millstones.....		200, 000
41	Oilstones, etc. ^a pounds..	420, 000	8, 000
42	Marls..... short tons..	1, 000, 000	500, 000
43	Flint..... long tons..	20, 000	80, 000
44	Fluorspar..... short tons..	4, 000	16, 000
45	Chromic iron ore..... long tons..	2, 288	27, 808
46	Infusorial earth..... short tons..	1, 833	45, 660
47	Feldspar..... long tons..	12, 500	60, 000
48	Mica..... pounds..	81, 669	127, 825
49	Cobalt oxide..... do.....	7, 251	24, 000
50	Slate ground as a pigment..... short tons..	1, 000	10, 000
51	Sulphur..... do.....	600	21, 000
52	Asbestos..... do.....	150	4, 312
53	Rutile..... pounds..	100	400
54	Lithographic stone..... short tons..		
55	Total value of nonmetallic mineral products.....		173, 279, 135
56	Total value of metallic products.....		190, 039, 865
57	Estimated value of mineral products unspecified.		6, 000, 000
58	Grand total		369, 319, 000

^a Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

SUMMARY.

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for the calendar years 1880 to 1899.

1881.		1882.		1883.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
4, 144, 254	\$87, 029, 334	4, 623, 323	\$106, 336, 429	4, 595, 510	\$91, 910, 200	1
33, 077, 000	43, 000, 000	36, 197, 695	46, 800, 000	35, 733, 622	46, 200, 000	2
1, 676, 300	34, 700, 000	1, 572, 186	32, 500, 000	1, 451, 249	30, 000, 000	3
71, 680, 000	12, 175, 600	91, 646, 232	16, 038, 091	117, 151, 795	18, 064, 807	4
117, 085	11, 240, 160	132, 890	12, 624, 550	143, 957	12, 322, 719	5
26, 800	2, 680, 000	33, 765	3, 646, 620	36, 872	3, 311, 106	6
60, 851	1, 764, 679	52, 732	1, 487, 042	46, 725	1, 253, 632	7
265, 668	292, 235	281, 616	309, 777	58, 800	52, 920	8
				83	875	9
50	10, 000	60	12, 000	60	12, 000	10
100	400	200	600	200	600	11
192, 892, 408		219, 755, 109		203, 128, 859		12
48, 179, 475	60, 224, 344	60, 861, 190	76, 076, 487	68, 531, 500	82, 237, 800	13
28, 500, 016	64, 125, 036	31, 358, 264	70, 556, 094	34, 336, 469	77, 257, 055	14
	20, 000, 000		21, 000, 000		20, 000, 000	15
27, 661, 238	25, 448, 339	30, 510, 830	24, 065, 988	23, 449, 633	25, 790, 252	16
30, 000, 000	20, 000, 000	31, 000, 000	21, 700, 000	32, 000, 000	19, 200, 000	17
			215, 000		475, 000	18
2, 500, 000	2, 000, 000	3, 250, 000	3, 672, 750	4, 190, 000	4, 293, 500	19
6, 200, 000	4, 200, 000	6, 412, 373	4, 320, 140	6, 192, 231	4, 211, 042	20
266, 734	1, 980, 259	332, 077	1, 992, 462	378, 380	2, 270, 280	21
6, 000, 000	4, 100, 000	3, 850, 000	2, 310, 000	3, 814, 273	1, 907, 136	22
3, 700, 000	700, 000	5, 000, 000	800, 000	7, 529, 423	1, 119, 603	23
10, 000	700, 000	10, 000	700, 000	12, 000	840, 000	24
25, 000	200, 000	30, 000	240, 000	32, 000	250, 000	25
6, 000	100, 000	7, 000	105, 000	7, 000	84, 000	26
4, 046, 000	304, 461	4, 236, 291	338, 903	6, 500, 000	585, 000	27
85, 000	350, 000	100, 000	450, 000	90, 000	420, 000	28
	500, 000		700, 000		600, 000	29
5, 000	60, 000	6, 000	75, 000	6, 000	75, 000	30
10, 000	60, 000	12, 000	72, 000	25, 000	137, 500	31
7, 000	75, 000	6, 000	90, 000	8, 000	150, 000	32
4, 895	73, 425	4, 532	67, 980	6, 155	92, 325	33
2, 000	8, 000	3, 000	10, 500	3, 000	10, 500	34
	110, 000		150, 000		207, 050	35
300, 000	75, 000	250, 000	75, 000	301, 100	72, 264	36
500	80, 000	500	80, 000	550	100, 000	37
20, 000	80, 000	20, 000	80, 000	27, 000	108, 000	38
400, 000	30, 000	425, 000	34, 000	575, 000	46, 000	39
	150, 000		200, 000		150, 000	40
500, 000	8, 580	600, 000	10, 000	600, 000	10, 000	41
1, 000, 000	500, 000	1, 080, 000	540, 000	972, 000	486, 000	42
25, 000	100, 000	25, 000	100, 000	25, 000	100, 000	43
4, 000	16, 000	4, 000	20, 000	4, 000	20, 000	44
2, 000	30, 000	2, 500	50, 000	3, 000	60, 000	45
1, 000	10, 000	1, 000	8, 000	1, 000	5, 000	46
14, 000	70, 000	14, 000	70, 000	14, 100	71, 112	47
100, 000	250, 000	100, 000	250, 000	114, 000	285, 000	48
8, 280	25, 000	11, 653	32, 046	1, 096	2, 795	49
1, 000	10, 000	2, 000	24, 000	2, 000	24, 000	50
600	21, 000	600	21, 000	1, 000	27, 000	51
200	7, 000	1, 200	36, 000	1, 000	30, 000	52
200	700	500	1, 800	550	2, 000	53
50	1, 000					54
206, 783, 144		231, 340, 150		243, 812, 214		55
192, 892, 408		219, 755, 109		203, 128, 859		56
6, 500, 000		6, 500, 000		6, 500, 000		57
406, 175, 552		457, 595, 259		453, 441, 073		58

Mineral products of the United States for

Product.		1884.	
		Quantity.	Value.
METALLIC.			
1	Pig iron, value at Philadelphia long tons..	4, 097, 868	\$73, 761, 624
2	Silver, coining value troy ounces..	37, 744, 605	48, 800, 000
3	Gold, coining value do.....	1, 489, 949	30, 800, 000
4	Copper, value at New York City pounds..	145, 221, 934	17, 789, 687
5	Lead, value at New York City short tons..	139, 897	10, 537, 042
6	Zinc, value at New York City do.....	38, 544	3, 422, 707
7	Quicksilver, value at San Francisco flasks..	31, 913	936, 327
8	Nickel, value at Philadelphia pounds..	64, 550	48, 412
9	Aluminum, value at Pittsburg do.....	150	1, 350
10	Antimony, value at San Francisco short tons..	60	12, 000
11	Platinum (crude), value at San Francisco, troy ounces.	150	450
12	Total value of metallic products		186, 109, 599
NONMETALLIC (spot values).			
13	Bituminous coal long tons..	73, 730, 539	77, 417, 066
14	Pennsylvania anthracite do.....	33, 175, 756	66, 351, 512
15	Stone do.....		19, 000, 000
16	Petroleum barrels..	24, 218, 438	20, 595, 966
17	Lime do.....	37, 000, 000	18, 500, 000
18	Natural gas		1, 460, 000
19	Brick clay		
20	Clay (all other than brick) long tons..	35, 000	270, 000
21	Cement barrels..	4, 000, 000	3, 720, 000
22	Salt do.....	6, 514, 937	4, 197, 734
23	Phosphate rock long tons..	431, 779	2, 374, 784
24	Limestone for iron flux do.....	3, 401, 930	1, 700, 965
25	Mineral waters gallons sold..	10, 215, 328	1, 459, 143
26	Zinc white short tons..	13, 000	910, 000
27	Mineral paints do.....	7, 000	84, 000
28	Borax pounds..	7, 000, 000	490, 000
29	Gypsum short tons..	90, 000	390, 000
30	Grindstones		570, 000
31	Fibrous talc short tons..	10, 000	110, 000
32	Pyrites long tons..	35, 000	175, 000
33	Soapstone short tons..	10, 000	200, 000
34	Manganese ore long tons..	10, 180	122, 160
35	Asphaltum short tons..	3, 000	10, 500
36	Precious stones		222, 975
37	Bromine pounds..	281, 100	67, 464
38	Corundum short tons..	600	108, 000
39	Barytes (crude) do.....	25, 000	100, 000
40	Graphite pounds..		
41	Millstones		150, 000
42	Oilstones, etc. a pounds..	800, 000	12, 000
43	Marls short tons..	875, 000	437, 500
44	Flint long tons..	30, 000	120, 000
45	Fluorspar short tons..	4, 000	20, 000
46	Chromic iron ore long tons..	2, 000	35, 000
47	Infusorial earth short tons..	1, 000	5, 000
48	Feldspar long tons..	10, 900	55, 112
49	Mica pounds..	147, 410	368, 525
50	Cobalt oxide do.....	2, 000	5, 100
51	Slate ground as a pigment short tons..	2, 000	20, 000
52	Sulphur do.....	500	12, 000
53	Asbestos do.....	1, 000	30, 000
54	Rutile pounds..	600	2, 000
55	Lithographic stone short tons..		
56	Total value of nonmetallic mineral products		221, 879, 506
57	Total value of metallic products		186, 109, 599
58	Estimated value of mineral products unspecified		5, 000, 000
59	Grand total		412, 989, 105

a Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

SUMMARY.

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the calendar years 1880 to 1899—Continued.

1885.		1886.		1887.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
4,044,425	\$64,712,400	5,683,329	\$95,195,760	6,417,148	\$121,925,800	1
39,910,279	51,600,000	39,445,312	51,000,000	41,269,240	53,350,000	2
1,538,376	31,800,000	1,881,250	35,000,000	1,596,500	33,000,000	3
170,962,607	18,292,999	161,235,381	16,527,651	185,227,331	21,115,916	4
129,412	10,469,431	130,629	12,200,749	145,700	13,113,000	5
40,688	3,539,856	42,641	3,752,408	50,340	4,782,300	6
32,073	979,189	29,981	1,060,000	33,825	1,429,000	7
277,904	179,975	214,992	127,157	205,566	133,200	8
283	2,550	3,000	27,000	18,000	59,000	9
50	10,000	35	7,000	75	15,000	10
250	187	50	100	448	1,838	11
181,586,587		214,897,825		248,925,054		12
64,840,668	82,347,648	73,707,957	78,481,056	87,887,360	98,004,656	13
34,228,548	76,671,948	34,853,077	76,119,120	37,578,747	84,552,181	14
	19,000,000		19,000,000		25,000,000	15
21,847,205	19,198,243	28,064,841	19,996,313	28,278,866	18,877,094	16
40,000,000	20,000,000					17
	4,857,200		10,012,000		15,817,500	18
			6,200,000		7,000,000	19
36,000	275,000	40,000	325,000	43,000	340,000	20
4,150,000	3,492,500	4,500,000	3,990,000	6,692,744	5,674,377	21
7,038,653	4,825,345	7,707,081	4,736,585	7,831,962	4,093,846	22
437,856	2,846,064	430,549	1,872,936	480,558	1,836,818	23
3,356,956	1,678,478	4,717,163	2,830,297	5,377,000	3,226,200	24
9,148,401	1,312,845	8,950,317	1,284,070	8,259,609	1,261,463	25
15,000	1,050,000	18,000	1,440,000	18,000	1,440,000	26
3,950	43,575	18,800	315,000	22,000	330,000	27
8,000,000	480,000	9,778,290	488,915	11,000,000	550,000	28
90,405	405,000	95,250	428,625	95,000	425,000	29
	500,000		250,000		224,400	30
10,000	110,000	12,000	125,000	15,000	160,000	31
49,000	220,500	55,000	220,000	52,000	210,000	32
10,000	200,000	12,000	225,000	12,000	225,000	33
23,258	190,281	30,193	277,636	34,524	333,844	34
3,000	10,500	3,500	14,000	4,000	16,000	35
	209,900		119,056		163,600	36
310,000	89,900	428,334	141,350	199,087	61,717	37
600	108,000	645	116,190	600	108,000	38
15,000	75,000	10,000	50,000	15,000	75,000	39
327,883	26,231	415,525	33,242	416,000	34,000	40
	100,000		140,000		100,000	41
1,000,000	15,000	1,160,000	15,000	1,200,000	16,000	42
875,000	437,500	800,000	400,000	600,000	300,000	43
30,000	120,000	30,000	120,000	32,000	128,000	44
5,000	22,500	5,000	22,000	5,000	20,000	45
2,700	40,000	2,000	30,000	3,000	40,000	46
1,000	5,000	1,200	6,000	3,000	15,000	47
13,600	68,000	14,900	74,500	10,200	61,200	48
92,000	161,000	40,000	70,000	70,000	142,250	49
68,723	65,373	35,000	36,878	18,340	18,774	50
1,975	24,687					51
715	17,875	2,500	75,000	3,000	100,000	52
300	9,000	200	6,000	150	4,500	53
600	2,000	600	2,000	1,000	3,000	54
241,312,093		230,088,769		270,989,420		55
181,586,587		214,897,825		248,925,054		56
5,000,000		800,000		800,000		57
427,898,680		445,786,594		520,714,474		58

Mineral products of the United States for

Product.		Quantity.	Value.
METALLIC.			
1	Pig iron, value at Philadelphia.....long tons..	6, 489, 738	\$107, 000, 000
2	Silver, coining value.....troy ounces..	45, 783, 632	59, 195, 000
3	Gold, coining value.....do.....	1, 604, 927	33, 175, 000
4	Copper, value at New York City.....pounds..	231, 270, 622	33, 833, 954
5	Lead, value at New York City.....short tons..	151, 919	13, 399, 256
6	Zinc, value at New York City.....do.....	55, 903	5, 500, 855
7	Quicksilver, value at San Francisco.....flasks..	33, 250	4, 113, 125
8	Aluminum, value at Pittsburg.....pounds..	18, 000	65, 000
9	Antimony, value at San Francisco.....short tons..	100	20, 000
10	Nickel, value at Philadelphia.....pounds..	204, 328	127, 632
11	Tin.....do.....		
12	Platinum (crude), value at San Francisco, troy ounces.	500	2, 000
13	Total value of metallic products.....		253, 731, 822
NONMETALLIC (spot values).			
14	Bituminous coal.....short tons..	102, 039, 838	101, 860, 529
15	Pennsylvania anthracite.....long tons..	41, 624, 611	89, 020, 483
16	Stone.....		25, 500, 000
17	Petroleum.....barrels..	27, 612, 025	17, 947, 620
18	Natural gas.....		22, 629, 875
19	Brick clay.....		7, 500, 000
20	Clay (all other than brick).....long tons..	36, 750	300, 000
21	Cement.....barrels..	6, 503, 295	5, 021, 139
22	Mineral waters.....gallons sold..	9, 578, 648	1, 679, 302
23	Phosphate rock.....long tons..	448, 567	2, 018, 552
24	Salt.....barrels..	8, 055, 881	4, 374, 203
25	Limestone for iron flux.....long tons..	5, 438, 000	2, 719, 000
26	Zinc white.....short tons..	20, 000	1, 600, 000
27	Gypsum.....do.....	110, 000	550, 000
28	Borax.....pounds..	7, 589, 000	455, 340
29	Mineral paints.....short tons..	26, 500	405, 000
30	Grindstones.....		281, 800
31	Fibrous talc.....short tons..	20, 000	210, 000
32	Asphaltum.....do.....	53, 800	331, 500
33	Soapstone.....do.....	15, 000	250, 000
34	Precious stones.....		139, 850
35	Pyrites.....long tons..	54, 331	167, 658
36	Corundum.....short tons..	589	91, 620
37	Oilstones, etc. a.....pounds..	1, 500, 000	18, 000
38	Mica.....do.....	48, 000	70, 000
39	Barytes (crude).....short tons..	20, 000	110, 000
40	Bromine.....pounds..	307, 386	95, 290
41	Fluorspar.....short tons..	6, 000	30, 000
42	Feldspar.....long tons..	8, 700	50, 000
43	Manganese ore.....do.....	29, 198	279, 571
44	Flint.....do.....	30, 000	127, 500
45	Graphite.....pounds..	400, 000	33, 000
46	Bauxite.....long tons..		
47	Sulphur.....short tons..		
48	Marls.....do.....	300, 000	150, 000
49	Infusorial earth.....do.....	1, 500	7, 500
50	Millstones.....		81, 000
51	Chromic iron ore.....long tons..	1, 500	20, 000
52	Cobalt oxide.....pounds..	8, 491	15, 782
53	Magnesite.....short tons..		
54	Asbestos.....do.....	100	3, 000
55	Rutile.....pounds..	1, 000	3, 000
56	Ozocerite (refined).....do.....	43, 500	3, 000
57	Total value of nonmetallic mineral products.....		286, 150, 114
58	Total value of metallic products.....		253, 731, 822
59	Estimated value of mineral products unspecified.....		900, 000
60	Grand total.....		540, 781, 936

a Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

SUMMARY.

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the calendar years 1889 to 1899—Continued.

1889.		1890.		1891.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
7,603,642	\$120,000,000	9,202,703	\$151,200,410	8,279,870	\$128,337,985	1
51,354,851	66,396,988	54,500,000	70,464,645	58,330,000	75,416,565	2
1,590,869	32,886,744	1,588,880	32,845,000	1,604,840	33,175,000	3
231,246,214	26,907,809	265,115,133	30,848,797	295,812,076	38,455,300	4
156,397	13,794,235	143,630	12,668,166	178,554	15,534,198	5
58,860	5,791,824	63,683	6,266,407	80,873	8,033,700	6
26,484	1,190,500	22,926	1,203,615	22,904	1,036,386	7
47,468	97,335	61,281	61,281	150,000	100,000	8
115	28,000	129	40,756	278	47,007	9
252,663	151,598	223,488	134,093	118,498	71,099	10
				125,289	25,058	11
500	2,000	600	2,500	100	500	12
267,247,033		305,735,670		300,232,798		13
95,685,543	94,504,745	111,320,016	110,420,801	117,901,237	117,188,400	14
40,714,721	65,879,514	41,489,858	66,383,772	45,236,992	73,944,735	15
	42,809,706		47,000,000		47,294,746	16
35,163,513	26,963,340	45,822,672	35,365,105	54,291,980	30,526,553	17
	21,097,099		18,742,725		15,500,084	18
	8,000,000		8,500,000		9,000,000	19
294,344	635,578	350,000	756,000	400,000	900,000	20
7,000,000	5,000,000	8,000,000	6,000,000	8,222,792	6,680,951	21
12,780,471	1,748,458	13,907,418	2,600,750	18,392,732	2,996,259	22
550,245	2,937,776	510,499	3,213,795	587,988	3,651,150	23
8,005,565	4,195,412	8,776,991	4,752,286	9,987,945	4,716,121	24
6,318,000	3,159,000	5,521,622	2,760,811	5,000,000	2,300,000	25
16,970	1,357,600		1,600,000	23,700	1,600,000	26
267,769	764,118	182,995	574,523	208,126	628,051	27
8,000,000	500,000	9,500,000	617,500	13,380,000	869,700	28
34,307	483,766	47,732	681,992	49,652	678,478	29
	439,587		450,000		476,113	30
23,746	244,170	41,354	389,196	53,054	493,068	31
51,735	171,537	40,841	190,416	45,054	242,264	32
12,715	231,708	13,670	252,309	16,514	243,981	33
	188,807		118,833		235,300	34
93,705	202,119	99,854	273,745	106,536	338,880	35
2,245	105,565	1,970	89,395	2,265	90,230	36
5,982,000	32,980		69,909	1,375,000	150,000	37
49,500	50,000	60,000	75,000	75,000	100,000	38
19,161	106,313	21,911	86,505	31,069	118,363	39
418,891	125,667	387,847	104,719	343,000	54,880	40
9,500	45,835	8,250	55,328	10,044	78,330	41
6,970	39,370	8,000	45,200	10,000	50,000	42
24,197	240,559	25,684	219,050	23,416	239,129	43
21,113	89,730	13,000	57,400	15,000	60,000	44
	72,662		77,500		110,000	45
728	2,366	1,844	6,012	3,593	11,675	46
1,150	7,850			1,200	39,600	47
139,522	63,956	153,620	69,880	135,000	67,500	48
3,466	23,372	2,532	50,240		21,988	49
	35,155		23,720		16,587	50
2,000	30,000	3,599	53,985	1,372	20,580	51
13,955	31,092	6,788	16,291	7,200	18,000	52
				439	4,390	53
30	1,800	71	4,560	66	3,960	54
1,000	3,000	400	1,000	300	800	55
50,000	2,500	350,000	26,250	50,000	7,000	56
	282,623,812		312,776,503		321,767,846	57
	267,247,033		305,735,670		300,232,798	58
	1,000,000		1,000,000		1,000,000	59
	550,870,845		619,512,173		623,000,644	60

Mineral products of the United States for

Product.		1892.	
		Quantity.	Value.
METALLIC.			
1	Pig iron (spot value).....long tons..	9,157,000	\$131,161,039
2	Silver, coining value.....troy ounces..	63,500,000	82,099,150
3	Gold, coining value.....do.....	1,596,375	33,000,000
4	Copper, value at New York City.....pounds..	352,971,744	37,977,142
5	Lead, value at New York City.....short tons..	173,654	13,892,320
6	Zinc, value at New York City.....do.....	87,260	8,027,920
7	Quicksilver, value at San Francisco.....flasks..	27,993	1,245,649
8	Aluminum, value at Pittsburg.....pounds..	259,885	172,824
9	Antimony, value at San Francisco.....short tons..		66,466
10	Nickel, value at Philadelphia.....pounds..	92,252	50,739
11	Tin.....do.....	162,000	32,400
12	Platinum, value (crude) at San Francisco.....troy ounces..	80	550
13	Total value of metallic products.....		307,716,239
NONMETALLIC (SPOT VALUES).			
14	Bituminous coal.....short tons..	126,856,567	125,124,381
15	Pennsylvania anthracite.....long tons..	46,850,450	82,442,000
16	Natural gas.....do.....		14,800,714
17	Petroleum.....barrels..	50,509,136	26,034,196
18	Brick clay.....do.....		9,000,000
19	Cement.....barrels..	8,758,621	7,152,750
20	Stone.....do.....		48,706,625
21	Corundum and emery.....short tons..	1,771	181,800
22	Garnet for abrasive purposes.....do.....		
23	Grindstones.....do.....		272,244
24	Infusorial earth and Tripoli.....short tons..		43,655
25	Millstones.....do.....		23,417
26	Oilstones, etc.....pounds..		146,730
27	Borax.....do.....	13,500,000	900,000
28	Bromine.....do.....	379,480	64,502
29	Fluorspar.....short tons..	12,250	89,000
30	Gypsum.....do.....	256,259	695,492
31	Marls.....do.....	125,000	65,000
32	Phosphate rock.....long tons..	681,571	3,296,227
33	Pyrite.....do.....	109,788	305,191
34	Salt.....barrels..	11,698,890	5,654,915
35	Sulphur.....short tons..	2,688	80,640
36	Barytes (crude).....do.....	32,108	130,025
37	Cobalt oxide.....pounds..	7,869	15,738
38	Mineral paints.....short tons..	51,704	767,766
39	Zinc white.....do.....	27,500	2,200,000
40	Asbestos.....do.....	104	6,416
41	Asphaltum.....do.....	87,680	445,375
42	Bauxite.....long tons..	10,518	34,188
43	Chromic iron ore.....do.....	1,500	25,000
44	Clay (all other than brick).....do.....	420,000	1,000,000
45	Feldspar.....do.....	15,000	75,000
46	Fibrous talc.....short tons..	41,925	472,485
47	Flint.....long tons..	20,000	80,000
48	Fuller's earth.....short tons..		
49	Graphite.....pounds..		104,000
50	Limestone for iron flux.....long tons..	5,172,114	3,620,480
51	Magnesite.....short tons..	1,004	10,040
52	Manganese ore.....long tons..	13,613	129,586
53	Mica.....pounds..	75,000	100,000
54	Mineral waters.....gallons sold..	21,876,604	4,905,970
55	Monazite.....pounds..		
56	Ozocerite, refined.....do.....	60,000	8,000
57	Precious stones.....do.....		312,050
58	Pumice stone.....short tons..		
59	Rutile.....pounds..	100	800
60	Soapstone.....short tons..	23,908	437,449
61	Total value of nonmetallic mineral products.....		339,958,842
62	Total value of metallic products.....		307,716,239
63	Estimated value of mineral products unspecified.....		1,000,000
64	Grand total.....		648,675,081

SUMMARY.

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the calendar years 1880 to 1899—(Continued).

1893.		1894.		1895.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
7, 124, 502	\$84, 810, 425	6, 657, 388	\$65, 007, 247	9, 446, 808	\$105, 198, 550	1
60, 000, 000	77, 575, 757	49, 501, 122	64, 000, 000	55, 727, 000	72, 051, 000	2
1, 739, 081	35, 950, 000	1, 910, 816	39, 500, 000	2, 254, 760	46, 610, 000	3
339, 785, 972	32, 054, 601	364, 866, 808	38, 141, 142	392, 639, 954	38, 682, 347	4
163, 982	11, 839, 590	159, 331	9, 942, 254	170, 000	11, 220, 000	5
78, 832	6, 306, 560	75, 328	5, 288, 026	89, 688	6, 278, 020	6
30, 164	1, 108, 527	30, 416	934, 000	36, 104	1, 337, 131	7
339, 629	266, 903	550, 000	316, 250	920, 000	464, 600	8
250	45, 000	200	36, 000	450	68, 000	9
49, 399	22, 197	9, 616	3, 269	10, 302	3, 091	10
8, 938	1, 788	None.	.....	None.	.....	11
75	517	100	600	150	900	12
	249, 981, 866		218, 168, 788		281, 913, 639	13
128, 385, 231	122, 751, 618	118, 820, 405	107, 653, 501	135, 118, 193	115, 749, 771	14
48, 185, 306	85, 687, 078	46, 358, 144	78, 488, 063	51, 785, 122	82, 019, 272	15
18, 412, 666	14, 346, 250	49, 344, 516	13, 954, 400	.....	13, 006, 650	16
8, 002, 467	28, 982, 326	8, 362, 245	35, 522, 085	62, 892, 276	57, 632, 296	17
1, 713	9, 000, 000	1, 495	9, 000, 000	8, 731, 401	9, 000, 000	18
	6, 262, 841		5, 030, 081		5, 482, 254	19
	33, 885, 573		36, 534, 788		33, 319, 131	20
	142, 325		95, 936		106, 256	21
	338, 787		223, 214		205, 768	22
	22, 582		11, 718		20, 514	23
	16, 645		13, 887		22, 542	24
	135, 173		136, 873		155, 881	25
8, 699, 000	652, 425	14, 680, 130	974, 445	11, 918, 000	595, 900	26
348, 399	104, 520	379, 444	102, 450	517, 421	134, 343	27
12, 400	84, 000	7, 500	47, 500	4, 000	24, 000	28
253, 615	696, 615	239, 312	761, 719	265, 508	807, 447	29
75, 000	40, 000	75, 000	40, 000	60, 000	30, 000	30
941, 368	4, 136, 070	996, 949	3, 479, 547	1, 038, 551	3, 606, 094	31
75, 777	256, 562	105, 940	383, 134	99, 549	322, 845	32
11, 816, 772	4, 054, 668	12, 967, 417	4, 739, 285	13, 669, 649	4, 423, 084	33
1, 200	42, 000	500	20, 000	1, 800	42, 000	34
28, 970	88, 506	23, 335	86, 983	21, 529	68, 321	35
8, 422	10, 346	6, 763	10, 145	14, 458	20, 675	36
37, 724	530, 384	41, 926	498, 083	50, 695	621, 552	37
24, 059	1, 804, 420	19, 987	1, 899, 090	20, 710	1, 449, 700	38
50	2, 500	325	4, 463	795	13, 525	39
47, 779	372, 232	60, 570	353, 400	68, 163	348, 281	40
9, 079	29, 507	11, 066	35, 818	17, 069	44, 000	41
1, 450	21, 750	3, 680	53, 231	1, 740	16, 795	42
400, 000	900, 000	360, 000	800, 000	360, 000	800, 000	43
18, 391	96, 553	17, 200	98, 900	23, 200	133, 400	44
35, 861	408, 436	89, 906	435, 060	39, 240	370, 895	45
29, 671	108, 848	38, 000	145, 920	36, 800	117, 760	46
	63, 232		64, 010	6, 900	41, 400	47
848, 103	2, 374, 833	918, 000	1, 849, 275	5, 247, 949	52, 582	48
3, 958, 055	7, 040	3, 698, 550	10, 240	2, 200	2, 623, 974	49
704	66, 614	1, 440	53, 435	9, 547	17, 000	50
7, 718	88, 929	6, 308	52, 388	.....	71, 769	51
66, 971	4, 246, 734	21, 569, 608	3, 741, 846	21, 463, 543	55, 831	52
23, 544, 495	7, 600	546, 855	36, 193	1, 573, 000	4, 254, 237	53
130, 000	.....	.....	.....	None.	137, 150	54
	264, 041		132, 250	.....	None.	55
	.....		.....	.....	113, 621	56
	.....		.....	.....	.....	57
	.....		.....	.....	.....	58
21, 071	255, 067	23, 144	401, 325	21, 495	266, 495	59
	.....		.....	.....	.....	60
	823, 318, 020		307, 455, 351	.....	338, 345, 361	61
	249, 981, 866		218, 168, 788	.....	281, 913, 639	62
	1, 000, 000		1, 000, 000	.....	1, 000, 000	63
	.....		.....	.....	.....	64
	574, 299, 886		526, 624, 139	.....	621, 259, 000	65

MINERAL RESOURCES.

Mineral products of the United States for

		1896.	
Product.		Quantity.	Value.
METALLIC.			
1	Pig iron (spot value).....long tons..	8,623,127	\$90,250,000
2	Silver, coining value.....troy ounces..	58,834,800	76,069,236
3	Gold, coining value.....do.....	2,568,132	53,088,000
4	Copper, value at New York City.....pounds..	460,061,430	49,456,603
5	Lead, value at New York City.....short tons..	188,000	10,523,000
6	Zinc, value at New York City.....do.....	81,499	6,519,920
7	Quicksilver, value at San Francisco.....flasks..	30,765	1,075,449
8	Aluminum, value at Pittsburg.....pounds..	1,300,000	520,000
9	Antimony, value at San Francisco.....short tons..	601	84,290
10	Nickel, value at Philadelphia.....pounds..	17,170	4,464
11	Tin.....do.....	None.	.....
12	Platinum, value (crude) at San Francisco.....troy ounces..	163	944
13	Total value of metallic products.....		287,596,906
NONMETALLIC (SPOT VALUES).			
14	Bituminous coal.....short tons..	137,640,276	114,891,515
15	Pennsylvania anthracite.....long tons..	48,523,287	81,748,651
16	Natural gas.....		13,002,512
17	Petroleum.....barrels..	60,960,361	58,518,709
18	Brick clay.....		9,000,000
19	Cement.....barrels..	9,513,473	6,473,213
20	Stone.....		30,142,661
21	Corundum and emery.....short tons..	2,120	113,246
22	Garnet for abrasive purposes.....do.....		
23	Grindstones.....		326,826
24	Infusorial earth and Tripoli.....short tons..	3,846	26,792
25	Millstones.....		22,567
26	Oilstones, etc.....pounds..		127,098
27	Borax.....do.....	13,508,000	675,400
28	Bromine.....do.....	546,580	144,501
29	Fluorspar.....short tons..	6,500	52,000
30	Gypsum.....do.....	224,139	573,344
31	Marls.....do.....	60,000	30,000
32	Phosphate rock.....long tons..	930,779	2,803,372
33	Pyrite.....do.....	115,438	320,183
34	Salt.....barrels..	13,850,726	4,040,839
35	Sulphur.....short tons..	5,260	87,200
36	Barytes (crude).....do.....	17,068	46,513
37	Cobalt oxide.....pounds..	10,700	15,801
38	Mineral paints.....short tons..	48,082	530,455
39	Zinc white.....do.....	20,000	1,400,000
40	Asbestos.....do.....	504	6,100
41	Asphaltum.....do.....	80,503	577,563
42	Bauxite.....long tons..	18,364	47,338
43	Chromic iron ore.....do.....	786	6,667
44	Clay (all other than brick).....do.....	360,000	800,000
45	Feldspar.....do.....	9,114	35,200
46	Fibrous talc.....short tons..	46,089	399,443
47	Flint.....long tons..	11,124	24,226
48	Fuller's earth.....short tons..	9,872	59,260
49	Graphite (crystalline).....pounds..	535,858	48,460
50	Graphite (amorphous).....tons..	760	
51	Limestone for iron flux.....long tons..	4,120,102	2,060,000
52	Magnesite.....short tons..	1,500	11,000
53	Manganese ore.....long tons..	10,088	90,727
54	Mica (sheet).....pounds..		65,441
55	Mica (scrap).....tons..		1,750
56	Mineral waters.....gallons sold..	25,796,312	4,136,192
57	Monazite.....pounds..	80,000	1,500
58	Ozocerite, refined.....do.....	None.	None.
59	Precious stones.....		97,850
60	Pumice stone.....short tons..		
61	Rutile.....pounds..	100	350
62	Soapstone.....short tons..	22,183	354,065
63	Total value of nonmetallic mineral products.....		833,936,110
64	Total value of metallic products.....		287,596,906
65	Estimated value of mineral products unspecified.....		1,000,000
66	Grand total.....		622,533,016

SUMMARY.

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the calendar years 1880 to 1899.—Continued.

1897.		1898.		1899.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
9,652,680	\$85,122,299	11,773,934	\$116,557,030	13,620,708	\$245,172,654	1
58,860,000	69,637,172	54,438,000	70,394,485	54,764,500	70,806,628	2
2,774,835	57,363,000	3,118,398	64,463,000	3,437,210	71,053,400	3
494,078,274	54,080,180	526,512,987	61,885,276	568,666,921	101,222,712	4
212,000	14,885,728	222,000	16,650,000	210,500	18,945,000	5
99,980	8,498,300	115,399	10,385,910	129,051	14,840,865	6
28,648	983,445	31,092	1,188,627	30,454	1,452,745	7
4,000,000	1,500,000	5,200,000	1,716,000	5,200,000	1,716,000	8
756	109,656	1,120	184,050	1,275	251,875	9
23,707	7,823	11,145	3,966	22,541	8,566	10
None.		None.		None.		11
150	900	225	1,913	300	1,800	12
	302,198,502		343,400,217		525,472,243	13
147,609,985	119,567,224	166,592,023	132,586,313	193,321,967	167,935,304	14
46,974,714	79,301,964	47,663,076	75,414,537	53,944,647	88,142,130	15
	13,826,422		15,296,813		20,024,873	16
60,475,516	40,874,072	55,364,233	44,193,359	57,070,850	64,603,904	17
	8,000,000		9,000,000		11,250,000	18
10,989,463	8,178,283	12,111,206	9,859,501	15,520,445	12,989,142	19
	34,667,772		36,607,264		44,713,660	20
2,165	106,574	4,064	275,064	4,900	150,600	21
2,554	80,853	2,967	86,850	2,765	98,325	22
	368,058		489,769		675,586	23
3,833	22,835	2,738	16,691	4,334	37,032	24
	25,332		25,934		28,115	25
	149,970		180,738		206,283	26
16,000,000	1,080,000	16,000,000	1,120,000	40,714,000	1,189,882	27
487,149	129,094	486,979	126,614	433,004	108,251	28
5,062	37,159	7,675	63,050	15,900	96,650	29
284,982	755,864	291,638	755,280	486,235	1,287,080	30
60,000	30,000	60,000	30,000	60,000	30,000	31
1,039,345	2,673,202	1,308,885	3,453,480	1,515,702	5,044,076	32
143,201	391,541	193,364	593,801	174,734	543,249	33
15,973,202	4,920,020	17,612,634	6,212,554	19,708,614	6,867,467	34
2,275	45,590	1,200	32,960	4,830	107,500	35
26,042	54,295	31,306	108,339	41,894	139,528	36
19,520	31,232	6,247	9,371	10,230	18,512	37
60,913	795,793	58,850	694,856	68,111	728,389	38
25,000	1,750,000	33,000	2,310,000	40,146	3,211,680	39
580	6,450	605	10,300	681	11,740	40
75,945	664,632	76,337	675,649	75,085	653,904	41
20,590	57,652	25,149	75,437	35,280	125,598	42
None.	None.	None.	None.	None.	None.	43
	1,000,000		1,000,000		1,731,537	44
11,175	43,100	12,000	32,395	27,202	238,545	45
57,009	396,936	54,356	411,430	54,655	438,150	46
11,952	26,227	19,130	42,670	36,852	229,345	47
17,113	112,272	14,860	106,500	12,381	79,644	48
1,254,402	54,277	2,360,000	75,200	2,900,732	167,106	49
1,108		890	2,324			50
4,247,688	2,124,000	5,275,819	2,638,000	6,707,435	4,695,205	51
1,143	13,671	1,263	19,075	1,280	18,480	52
11,108	95,506	15,957	129,185	9,935	82,278	53
82,676	80,774	129,520	103,534	108,570	70,587	54
740	14,452	3,999	27,564	1,505	50,878	55
23,255,911	4,599,106	28,853,464	8,051,833	39,562,136	6,948,030	56
44,000	1,980	250,776	13,542	350,000	20,000	57
None.	None.	None.	None.	None.	None.	58
	130,675		160,920		155,770	59
158		600	13,200	400	10,000	60
100	350	140	700	230	1,030	61
21,923	365,629	22,231	287,112	24,765	330,805	62
	327,655,427		353,417,364		446,087,850	63
	302,198,502		343,400,217		525,472,243	64
	1,000,000		1,000,000		1,000,000	65
	630,853,929		697,817,581		972,560,093	66

IRON ORES.

By JOHN BIRKINBINE.

PRODUCTION.

The production of iron ore in the United States in the year ending December 31, 1899, amounted to 24,683,173 long tons, which was 5,249,457 long tons, or 27 per cent, in excess of the previous maximum of 19,433,716 long tons in the year 1898. The records of 1898 and 1899 represent maxima of iron ore mined in any country in one year, the nearest approach to these being a total of 18,026,049 long tons, won in the year 1880 in Great Britain.

Twenty-four States and Territories—the same number as in 1898—contributed to this total, but Montana was not reported as a producer, and West Virginia was returned to the active list in 1899. Practically all of the States, with the exception of Colorado, New Jersey, Maryland, and the far Western group, showed an increase in output. Missouri may also be counted as having a larger output than in 1898, for a quantity of lean ore mined in former years was not marketed until 1898. This augmented production, however, was principally from the States of Minnesota and Michigan, the former being credited with an increase of 2,197,780 long tons over the 1898 output and the latter with an increase of 1,799,311 long tons.

The amount of pig iron manufactured in the year 1899 was 13,620,703 long tons, and if all the ore mined in the United States in that year had been smelted in the production of this pig iron it would show that 1.81 tons of iron ore were required to make a ton of pig iron, but allowance must be made for the difference in the stocks of ore, the foreign ore imported, the ore used for other purposes than pig iron manufactures, and the other iron-bearing material fed to the furnaces.

If to the amount mined in 1899 is added the decrease in the stocks of ore on hand at the mines, the amount of foreign ore imported, etc., the grand total sent to the consumers will approximate 26,000,000 tons.

The output of iron ore in the United States for the years 1889 to 1899, inclusive, the period during which data were systematically collected by the United States Geological Survey, is shown in the annexed table.

Production of iron ore in the United States from 1889 to 1899.

Year.	Production.	Year.	Production.
	<i>Long tons.</i>		<i>Long tons.</i>
1889.....	14,518,041	1896.....	16,005,449
1890.....	16,036,043	1897.....	17,518,046
1891.....	14,591,178	1898.....	19,433,716
1892.....	16,296,666	1899.....	24,683,173
1893.....	11,587,629	Total.....	178,507,234
1894.....	11,879,679		
1895.....	15,957,614		

From this it will be seen for eleven years the average product has been 16,227,930 tons per annum. In the years above mentioned, viz, 1889 to 1899, inclusive, when 178,507,234 long tons of iron ore were mined, 101,141,857 long tons of pig iron were smelted, representing an average of 1.76 tons of domestic iron ore mined per ton of pig iron made.

CLASSIFICATION OF IRON ORES.

The iron ores of this country have been subdivided, as in previous reports, into the following general classes:

1. *Red hematite*, being all anhydrous hematites, although known by various names, such as red hematite, specular, micaceous, fossil, slate iron ore, martite, blue hematite, etc.
2. *Brown hematite*, including the varieties of hydrated sesquioxide of iron, recognized as limonite, gothite, turgite, bog ores, pipe ores, etc.
3. *Magnetite*, those ores in which the iron occurs as magnetic oxide and including some martite, which is mined with the magnetite.
4. *Carbonate*, those ores which contain a considerable amount of carbonic acid, such as spathic ore, blackband, siderite, clay iron-stone, etc.

The red hematites continue to be the most prominent of the class of iron ore, contributing 20,004,399 long tons, or 81 per cent, of the total for 1899. But while this was an increase of 3,853,715 long tons, or 24 per cent, over the 1898 output, the percentage of the total iron ore mined represented by the red hematites decreased from 83.1 per cent in 1898 to 81 per cent in 1899.

Of the brown hematites 2,869,785 long tons were won, which was 11.6 per cent of the iron ore mined in the United States, as against 1,989,681 long tons, or 10.2 per cent, in 1898, and represents an advance over 1898 of 880,104 long tons, or 44 per cent.

The magnetite product amounted to 1,727,430 long tons, or 7 per cent of the total for the United States, as against 1,237,978 long tons, or 6.4 per cent, in 1898, an increase of 489,452 long tons and an advance of 40 per cent.

The balance, 81,559 long tons, or 0.33 per cent of the iron ore produced in the United States, was of the carbonate variety, as against 55,373 long tons, or 0.3 per cent of the total, for 1898, showing an increase of 26,186 tons, or 47 per cent.

From this it will be seen that there was a general increase in the amounts of all the different classes, due to active demand upon local mines to supplement ore obtained from the large producers.

A number of iron-ore deposits which had not been wrought for years resumed operations in 1899, and in some instances exploitations will be continued. The advantages to blast furnaces of at least a partial local supply of ores and the application of improved mining methods will probably encourage the working of some of the deposits which were inactive during the business depression.

Michigan is the largest producer of red hematites, followed in order by Minnesota and Alabama. Virginia heads the list as a source of supply for brown hematites, Alabama and Tennessee taking second and third places, respectively. Pennsylvania produced the largest amount of magnetite, followed by New York and New Jersey, while Ohio contributed the greatest amount of carbonate ore.

The following table gives the amounts of different classes of iron ore by States in the year 1899, in accordance with the classification mentioned above, as closely as this can be obtained. In some mines red hematite and magnetite are intimately associated, or the hydration of the hematites is variable, while the weathered ores of carbonate formations may be considered as brown hematites. Hence a close classification is impracticable. The table, however, gives in a general way the proportions of the different classes of ores which contribute to the total supply of iron ores obtained from mines in the United States.

Production of iron ores in the United States in 1899, by States and Territories.

[Long tons.]

State or Territory.	Red hematite.	Brown hematite.	Magnetite.	Carbonate.	Total.
Michigan	8,863,942	44,645	237,570	.....	9,146,157
Minnesota	8,161,289	.....	.....	.....	8,161,289
Alabama	1,911,097	751,846	.....	.....	2,662,943
Pennsylvania	38,331	152,468	815,771	2,757	1,009,327
Virginia and West Virginia	17,173	968,143	1,160	.....	986,476
Tennessee	298,704	333,342	.....	.....	632,046
Wisconsin	531,636	48,162	.....	.....	579,798
New York	45,503	31,975	344,159	22,153	443,790
Colorado	12,327	295,230	.....	.....	307,557
New Jersey .....	.....	.....	256,185	.....	256,185
Georgia	57,000	179,748	.....	.....	236,748
Nevada, New Mexico, Utah, and Wyoming	11,541	6,850	35,757	.....	54,148
Ohio .....	.....	.....	.....	53,221	53,221
North Carolina .....	.....	10,788	36,828	.....	47,616
Kentucky	35,384	.....	.....	.....	35,384
Connecticut and Massachusetts .....	.....	29,611	.....	.....	29,611
Missouri	20,472	2,248	.....	.....	22,720
Texas .....	.....	14,729	.....	.....	14,729
Maryland .....	.....	.....	.....	3,428	3,428
Total	20,004,399	2,869,785	1,727,430	81,559	24,683,173

Considering the production of the different classes of iron ore for a period of eleven years, during which the United States Geological Survey has collated statistics, it is found that the red hematite mines have furnished about three-fourths of the total, followed in order by those producing brown hematite, magnetite, and carbonate ore.

The amounts of each variety of ore mined in the United States from 1889 to 1899 inclusive, the average percentage of each class during that period, and the percentages of the total in 1899 will be found in the following table:

Production of iron ores in the United States, by classes.

[Maxima in italic figures.]

Year.	Red hematite.	Brown hematite.	Magnetite.	Carbonate.	Total.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
1889.....	9,056,288	2,523,087	2,506,415	<i>432,251</i>	14,518,041
1890.....	10,527,650	2,559,938	<i>2,570,838</i>	377,617	16,036,043
1891.....	9,327,398	2,757,564	2,317,108	189,108	14,591,178
1892.....	11,646,619	2,485,101	1,971,965	192,981	16,296,666
1893.....	8,272,637	1,849,272	1,330,886	134,834	11,587,629
1894.....	9,347,434	1,472,748	972,219	87,278	11,879,679
1895.....	12,513,995	2,102,358	1,268,222	73,039	15,957,614
1896.....	12,576,288	2,126,212	1,211,526	91,423	16,005,449
1897.....	14,413,318	1,961,954	1,059,479	83,295	17,518,046
1898.....	16,150,684	1,989,681	1,237,978	55,373	19,433,716
1899.....	<i>20,004,399</i>	<i>2,869,785</i>	1,727,430	81,559	<i>24,683,173</i>
Total.....	133,836,710	24,697,700	18,174,066	1,798,758	178,507,234
Percentages of totals for eleven years.	75	13.8	10.2	1	100
Percentages of total for 1899	81.04	11.63	7	0.33	100

Notwithstanding the active demand in the year 1899, it will be noted that the output of brown hematite is but slightly above the previous maximum of 1891. The amount of magnetite won was greater in 1889, 1890, 1891, and 1892 than in 1899, and prior to 1895, as well as in 1896 and 1897, the quantity of carbonate ores annually mined exceeded the record of 1899. In addition to the iron ore mined there was 65,010 long tons of zinc residuum, or clinker, produced, which was utilized in the production of spiegeleisen. There was also an increased production of concentrated magnetic iron ore, the amount reported in 1899 being 94,217 long tons as against 38,434 long tons in 1898. Rolling-mill cinder and scale, silicate of iron, copper residuum, etc., are also used in charges for blast furnaces to a limited extent.

Owing to the fact that most of the iron ore mines make contracts with the consumers in the early portion of the year the prices for iron ore did not show such a marked advance in the year 1899 as they will in the year 1900, when the miners participated to a greater degree in the increased demand and good prices for iron and steel. It is possible also that the control by steel manufacturers of a large proportion of the important mines may exert a restraining influence on the sales and the shipment of ores from the Lake Superior mines to distributing ports on the lower lakes.

LAKE SUPERIOR REGION.

The Lake Superior region increased its former maximum output of 13,779,308 long tons in 1898 to 17,802,955 long tons in 1899. These figures are those of production and not of shipments, for the latter are considerably in excess for 1899, owing to the fact that stock piles at the mines were reduced during the year, as will be noted under the subhead of stocks.

The amounts mined from the various ranges during the last eleven years is as follows:

Production of Lake Superior iron ores by ranges.

[Maxima in italics.]

Range.	1889.	1890.	1891.	1892.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Marquette	2,631,026	2,863,848	2,778,482	2,848,552
Menominee	1,876,157	2,274,192	1,856,124	2,402,195
Gogebic	2,147,923	2,914,081	2,041,754	<i>3,058,176</i>
Vermilion	864,508	891,910	945,105	1,226,220
Mesabi				29,245
Total	7,519,614	8,944,031	7,621,465	9,564,388

Range.	1893.	1894.	1895.	1896.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Marquette	2,064,827	1,935,379	1,982,080	2,418,846
Menominee	1,563,049	1,255,255	1,794,970	1,763,235
Gogebic	1,466,815	1,523,451	2,625,475	2,100,398
Vermilion	815,735	1,055,229	1,027,103	1,200,907
Mesabi	684,194	1,913,234	2,839,350	3,082,973
Total	6,594,620	7,682,548	10,268,978	10,566,359

Range.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Marquette	2,673,785	2,987,930	<i>3,634,596</i>
Menominee	1,767,220	2,275,664	<i>3,281,422</i>
Gogebic	2,163,088	2,552,205	2,725,648
Vermilion	1,381,278	1,125,538	<i>1,643,984</i>
Mesabi	4,220,151	4,837,971	<i>6,517,305</i>
Total	12,205,522	13,779,308	<i>17,802,955</i>

In the above tables the ranges have been placed in the order of their opening, and it will be noted that with the exception of the Gogebic all of the ranges mined their maximum product in the year 1899, the Gogebic reaching its greatest total in the year 1892.

Considering the ranges in the order of their product in 1899, the Mesabi range, with its rich, easily mined ores, is first with a total of 6,517,305 long tons.

The Marquette range, the one first opened, continues to furnish a large proportion of the output of Lake Superior region, 3,634,596 long tons being the record for 1899. This range has shown a continued increase since the year 1894.

The Menominee range reached the three-million mark for the first time in 1899, when it contributed 3,281,422 long tons.

The Gogebic range, while a constant producer, mining 2,725,648 long tons in 1899, has not equaled its 1892 output, when 3,058,176 tons were mined, nor even the 1890 total.

The Vermilion range attained its maximum of 1,643,984 tons in the year 1899.

The product of the Lake Superior mines, representing over 70 per cent of the total for the United States, is marketed upon a careful system of cargo analyses, which have, as in former reports, been given place as adding interest to this report.

Cargo analyses of Lake Superior iron ores, season 1899.

[The upper line of figures opposite each ore represent its analysis when dried at 212° F.; the lower line, when in its natural condition.]

GOGEBIC RANGE.

Name of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Loss by ignition.	Moisture.
	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per cent.</i>
Ashland*.....	63.00	.....	0.045	.....	.....	.....	.....	.....	.....	.....
	55.44	.....	.0396	.....	.....	.....	.....	.....	.....	12.00
Atlantic*.....	62.77	4.16	.043	1.04	1.11	0.19	0.105	0.015	.....	.....
	55.2438	3.6612	.0378	.9153	.9769	.1672	.0924	.0132	.....	11.99
Aurora.....	61.81	5.48	.027	.43	1.11	.07	.10	.010	4.02	.....
	55.72	4.94	.024	.39	1.00	.063	.09	.009	3.62	9.86
Best.....	55.482	13.94	.056	1.00	1.62	.35	.26	.025	3.03	.....
	48.28	12.13	.0487	.87	1.40	.30	.22	.021	2.63	12.96
Bonnie.....	53.45	11.04	.0275	5.11	1.40	.14	1.10	.025	3.51	.....
	47.372	9.78	.0243	4.52	1.24	.12	.97	.022	3.11	11.37
Brotherton.....	63.03	7.04	.029	.405	.756	.400	.046	.009	1.150	.....
	56.27	6.292	.026	.362	.676	.358	.041	.008	1.03	10.73
Buckeye.....	58.29	10.50	.059	.43	1.97	.14	.46	.025	2.55	.....
	50.94	9.17	.052	.38	1.72	.12	.40	.022	2.23	12.61
Cary Empire.....	57.79	4.54	.057	3.97	.77	.18	.10	.005	5.75	.....
	52.2306	4.1083	.0515	3.5881	.6959	.1627	.0904	.0045	5.1969	9.62
Colby No. 1.....	57.66	3.61	.064	6.12	1.345	.34	.23	.009	6.94	.....
	51.89	3.25	.058	5.51	1.211	.31	.25	.0081	6.25	10.00

Above are average cargo analyses of the season 1899, except when marked thus: *. Ores so marked show the expected analyses for the season 1900.

MINERAL RESOURCES.

Cargo analyses of Lake Superior iron ores, season 1899—Continued.

GOGEBIC RANGE—Continued.

Name of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Loss by ignition.	Moisture.
	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per cent.</i>
Colby No. 2	60.87	3.74	0.092	2.80	1.28	0.17	0.23	0.006	4.60	.....
	54.94	3.40	.084	2.56	1.16	.15	.21	.006	4.19	9.00
Cass*	53.65	8.14	.053	7.22	.86	.21	2.17	.019	3.13	.....
	47.385	7.41	.0467	6.67	.75	.18	1.91	.016	2.76	11.77
Day	62.370	.....	.0723	.....	.....	.....	.....	.....	.....	.....
	55.8061	.....	.0646	.....	.....	.....	.....	.....	.....	10.524
Fairfax	63.287	.....	.0736	.756	.....	.....	.....	.....	.....	.....
	54.6774	.....	.0635	.6531	.....	.....	.....	.....	.....	13.604
Globe	64.23	6.68	.117	.19	.....	.....	.....	.....	.....	.....
	56.5224	5.8784	.1029	.1672	.....	.....	.....	.....	.....	12.00
Iron Belt	60.66	8.35	.045	.35	1.60	.18	.13	.011	2.40	.....
	53.59	7.38	.040	.31	1.41	.16	.11	.010	2.12	11.66
Lawrence	61.83	5.90	.057	.57	1.88	.15	.13	.020	3.30	.....
	55.61	5.31	.051	.51	1.24	.13	.12	.018	2.97	10.06
Melrose	62.19	4.72	.0302	.91	.96	.16	.09	.018	3.86	.....
	55.025	4.17	.0267	.80	.84	.14	.07	.015	3.41	11.52
Mikado	56.35	15.05	.188	.35	1.10	.24	.17	.010	2.30	.....
	48.6582	12.9957	.1192	.3022	.9499	.2072	.1468	.0086	1.9861	13.65
Montreal	65.42	3.14	.041	.84	.71	.13	.12	.017	3.34	.....
	60.09	2.88	.038	.77	.65	.12	.11	.016	3.07	8.14
Newport	53.702	5.63	.0392	7.66	1.12	.17	.14	.009	5.06	.....
	48.267	5.06	.0352	6.88	1.00	.15	.12	.008	4.54	10.12
New Era	57.105	11.40	.0285	1.41	1.24	.19	.10	.011	3.43	.....
	50.44	10.06	.0251	1.24	1.09	.16	.08	.009	3.02	11.67
Norrie	62.957	.....	.0420	.....	.....	.....	.....	.....	.....	.....
	56.4736	.....	.0376	.....	.....	.....	.....	.....	.....	10.296
North Vein	62.58	5.50	.048	.41	1.20	.09	.08	.004	.....	.....
	56.26	4.94	.043	.37	1.08	.08	.07	.004	.....	10.10
Palms	61.856	5.28	.0556	.90	1.31	.17	.12	.012	3.26	.....
	52.633	4.49	.047	.76	1.11	.14	.10	.010	2.77	14.91
Rand	62.340	.....	.0460	3.610	.....	.....	.....	.....	.....	.....
	54.7968	.....	.0404	3.1731	.....	.....	.....	.....	.....	12.100
Sunday Lake*	63.00	7.00	.030	.32	1.34	.16	.06	.006	.59	.....
	56.07	6.23	.0267	.235	1.193	.143	.054	.005	.53	11.00
Taylor*	62.00	.....	.065	.....	.....	.....	.....	.....	.....	.....
	54.56	.....	.0572	.....	.....	.....	.....	.....	.....	12.00
Tilden	62.737	.....	.0476	.784	.....	.....	.....	.....	.....	.....
	54.2386	.....	.0411	.6777	.....	.....	.....	.....	.....	13.546
Tilden No. 8	62.358	.....	.0400	1.678	.....	.....	.....	.....	.....	.....
	54.1396	.....	.0347	1.4568	.....	.....	.....	.....	.....	13.179

MENOMINEE RANGE.

Amasa	55.64	6.84	0.218	0.29	2.95	2.05	1.92	0.015	5.30	.....
	53.6982	6.6013	.2104	.2799	2.8470	1.9785	1.8530	.0145	5.1150	3.49
Ajax	52.17	11.14	.0607	.86	2.22	1.56	4.70	.022	3.94	.....
	48.612	10.38	.0565	.80	2.06	1.45	4.37	.020	3.67	6.82
Badger	59.91	4.47	.120	.22	2.52	1.20	1.97	.100	.....	.....
	54.39	4.06	.110	.20	2.29	1.09	1.79	.091	.....	9.22

Above are average cargo analyses of the season 1899, except when marked thus: *. Ores so marked show the expected analyses for the season 1900.

IRON ORES.

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Cargo analyses of Lake Superior iron ores, season 1899—Continued.

MENOMINEE RANGE—Continued.

Name of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Loss by ignition.	Moisture.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per cent.
Barton	59.828		0.580							
	56.4752		.5002							5.604
Bristol	50.00	6.10	.738	2.69	3.34	3.77	1.97	0.083	7.95	
	46.09	5.62	.680	2.48	3.08	3.48	1.82	.080	7.33	7.82
Cedar	52.00	10.26	.190	.30	3.95	1.75	4.87	.180	3.68	
	47.59	9.39	.174	.27	3.61	1.60	4.46	.119	3.87	8.49
Chapin *	58.13	6.20	.065	.54	1.41	1.235	3.565	.019	3.22	
	54.08	5.76	.080	.485	1.31	1.145	3.31	.017	3.00	6.96
Clifford	41.01	39.10	.014	.09	.97	.49	.29	.008	.45	
	39.96	38.10	.0136	.087	.945	.48	.28	.0029	.44	2.55
Columbia No. 1	60.00	5.10	.52	.23	1.99	.61	.90	.060	4.15	
	53.28	4.52	.461	.20	1.76	.54	.79	.044	3.68	11.20
Columbia No. 2	54.48	12.15	.46	.21	1.95	1.20	.65	.049	2.56	
	48.378	10.78	.408	.18	1.73	1.09	.57	.043	2.27	11.20
Crystal Falls	58.40	4.09	.71	.31	1.40	2.62	2.02	.007	3.51	
	53.84	3.77	.655	.29	1.29	2.42	1.86	.006	3.24	7.80
Davidson	56.03	7.64	.180	.24	3.43	1.27	2.89	.080	5.00	
	50.78	6.92	.163	.22	3.11	1.15	2.62	.073	4.53	9.37
Florence	56.02	4.85	.325	.38	2.86	1.70	2.50	.125	5.44	
	51.459	4.45	.298	.34	2.62	1.56	2.29	.114	4.99	8.14
Granada	61.52	4.60	.061	.23	1.53	.36	1.63	.015	2.30	
	56.64	4.23	.056	.21	1.41	.33	1.50	.014	2.12	7.93
Great Western *	60.40	5.80	.385	.61	1.21	2.24	1.65	.009	2.43	
	55.39	5.32	.353	.56	1.11	2.05	1.51	.008	2.23	8.30
Hemlock	58.72	5.70	.272	.20	2.66	1.92	1.55	.006	2.95	
	56.4064	5.4754	.2613	.1921	2.5552	1.8444	1.4889	.0058	2.8338	3.94
Keel Ridge	40.64	37.42	.046	.20	.90	1.35	1.00	.006		
	39.46	36.33	.045	.19	.87	1.31	.97	.0053		2.90
Lamont	58.10	4.31	.673	.35	1.25	1.92	2.34	.009	3.60	
	53.39	3.96	.618	.32	1.15	1.76	2.15	.008	3.31	8.10
Lincoln *	60.20	5.05	.290	.66	1.67	2.29	2.35	.010	2.95	
	55.38	4.65	.267	.61	1.54	2.11	2.16	.0092	2.71	8.00
Loretto	57.067	13.20	.0205	.20	2.12	.32	.57	.062	1.59	
	52.09	12.04	.0187	.18	1.93	.29	.52	.056	1.45	8.72
Manganate	50.00	4.45	.626	4.82	2.50	2.53	2.73	.021	7.98	
	47.70	4.24	.597	4.60	2.38	2.41	2.60	.020	7.61	4.61
Millie	63.705	2.97	.0275	.12	.94	1.14	1.49	.008	2.12	
	60.092	2.80	.0259	.11	.88	1.07	1.40	.007	1.99	5.67
Nimick	62.72	4.35	.071	.22	1.25	.65	2.24	.03	1.65	
	57.71	4.00	.065	.20	1.15	.60	2.06	.027	1.52	7.99
Pewabic	63.21	5.43	.009	.11	1.04	.86	1.12	.003	1.20	
	58.7853	5.0964	.0084	.1023	.9672	.7996	1.0416	.0028	1.1160	7.00
Pewabic Genoa	45.97	32.40	.009	.09	1.30	.79	1.08	.002	1.24	
	43.5566	30.6990	.0085	.0853	1.2318	.7485	1.0233	.0019	1.1749	5.25
Quinnesc *	49.61	27.80	.023	.27	.56	.82	.43	.010	2.40	
	48.53	27.19	.027	.26	.54	.80	.47	.010	2.35	2.18
Russell	54.10	10.00	.067	.32	2.15	3.02	2.65	.032	4.57	
	50.432	9.32	.0624	.29	2.00	2.81	2.47	.029	4.26	6.78
San Jose	64.405	4.64	.014	.30	1.24	.19	.39	.027	.64	
	59.072	4.25	.0128	.27	1.13	.17	.35	.024	.58	8.28

Above are average cargo analyses of the season 1899, except when marked thus: *. Ores so marked show the expected analyses for the season 1900.

MINERAL RESOURCES.

Cargo analyses of Lake Superior iron ores, season 1899—Continued.

MENOMINEE RANGE—Continued.

Name of ore.	Iron.	Silica.	Phos- pho- rus.	Man- ga- nese.	Alum- ina.	Lime.	Mag- nesia.	Sul- phur.	Loss by ig- nition.	Mols- ture.
	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per cent.</i>
Sheridan	55.48	7.37	0.224	0.25	4.48	0.75	0.59	0.610	5.35	.....
	49.5880	6.5873	.2002	.2234	4.0042	.6708	.5273	.5452	4.7818	10.62
Toledo	54.21	19.80	.010	.11	1.20	.88	1.08	.004	1.20	.....
	50.9574	18.6120	.0094	.1034	1.1280	.8272	1.0152	.0038	1.1280	6.00
Tyrone	60.40	6.59	.088	.16	1.38	1.25	2.15	.001	2.05	.....
	56.1720	6.1287	.0818	.1488	1.2834	1.1625	1.9995	.0009	1.9065	7.00
Walpole	58.75	10.51	.120	.13	1.30	.79	1.96	.002	1.22	.....
	55.8125	9.9845	.1140	.1235	1.2350	.7505	1.8620	.0019	1.1590	5.00

MARQUETTE RANGE.

Abbottsford*	64.22	4.42	.033	.18	1.69	.31	.17	.014	.....	.....
	62.6530	4.3121	.0321	.1756	1.6487	.3024	.1658	.0136	.....	2.44
Alford*	63.74	3.39	.052	.35	1.83	.31	.20	.020	.....	.....
	55.4856	2.9509	.0452	.3046	1.5630	.2698	.1741	.0174	.....	12.95
Angeline, Harl	66.71	2.19	.016	.11	1.47	.10	.05	.013	.66	.....
	63.3278	2.0789	.0151	.1044	1.3954	.0949	.0474	.0123	.6265	5.07
Angeline, Hematite	64.40	4.05	.045	.32	1.31	.15	.09	.012	2.01	.....
	57.7539	3.6820	.0403	.2869	1.1748	.1345	.0807	.0107	1.8025	10.32
Angeline, South	62.17	5.04	.099	.40	1.56	.18	.12	.025	3.40	.....
	54.6722	4.4321	.0870	.3517	1.3718	.1582	.1055	.0219	2.9899	12.06
Bell	39.985	38.27	.0332	.22	1.28	.13	.16	.028	2.29	.....
	38.853	37.18	.0322	.21	1.14	.12	.15	.027	2.22	2.83
Bedford*	59.05	8.84	.122	.52	1.49	.41	.31	.027	.....	.....
	51.9640	7.7792	.1073	.4576	1.3112	.3608	.2728	.0237	.....	12.00
Beresford*	63.61	4.88	.105	.39	2.57	.43	.43	.013	.....	.....
	62.8721	4.8238	.1037	.3854	2.5401	.4250	.4250	.0128	.....	1.16
Buffalo	60.973	.....	.069	.....	.....	.....	.....	.....	.....	.....
	53.3013	.....	.0934	.....	.....	.....	.....	.....	.....	12.582
Cameo	58.826	.....	.1162	.....	.....	.....	.....	.....	.....	.....
	51.3627	.....	.1014	.....	.....	.....	.....	.....	.....	12.687
Cambria	60.20	6.49	.056	.31	2.03	.88	.37	.010	2.53	.....
	53.46	5.76	.050	.28	1.80	.78	.33	.0089	2.25	11.20
Cambridge	59.71	7.10	.610	.42	1.25	2.50	.52	.004	1.81	.....
	50.5803	6.0144	.5167	.3557	1.0588	2.1177	.4404	.0083	1.5332	15.29
Castleford*	58.64	10.43	.094	.36	2.87	.40	.40	.020	.....	.....
	58.1356	10.3408	.0931	.3569	2.8458	.3965	.3965	.0198	.....	.86
Champion No. 1*	64.00	4.55	.060	.20	2.38	.32	.29	.013	.....	.....
	63.44	4.51	.0594	.198	2.36	.317	.287	.0128	.....	.88
Chatford*	50.72	17.70	.105	.78	1.25	.31	.31	.027	.....	.....
	44.9683	15.6928	.0930	.6915	1.1082	.2748	.2748	.0239	.....	11.34
Cliffs Shaft	60.90	4.030	.109	.384	2.446	1.148	1.339	.025	2.710	.....
	60.00	3.970	.107	.378	2.410	1.131	1.319	.024	2.670	1.47
Comrade	56.51	11.11	.126	.073	3.817	.27	.70	.037	2.70	.....
	55.89	10.99	.124	.072	3.775	.26	.69	.036	2.67	1.09
Imperial	52.70	12.890	.281	.161	1.004	1.027	1.218	.018	7.470	.....
	47.95	11.730	.255	.146	.913	.934	1.108	.016	6.797	9.00
Jackson Pit 7	55.00	14.38	.076	.37	2.49	.14	.11	.022	3.73	.....
	51.05	13.85	.071	.34	2.31	.13	.10	.020	3.46	7.18

Above are average cargo analyses of the season 1899, except when marked thus: *. Ores so marked show the expected analyses for the season 1900.

IRON ORES.

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Cargo analyses of Lake Superior iron ores, season 1899—Continued.

MARQUETTE RANGE—Continued.

Name of ore.	Iron.	Silica.	Phos- phorus.	Man- ga- nese.	Alum- ina.	Lime.	Mag- nesia.	Sul- phur.	Loss by ig- nition.	Mois- ture.
	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per cent.</i>
Jackson, So. Silica.....	43.50		0.055	3.50						
	40.0417		.0508	3.2475						7.50
Lake	59.90	6.010	.100	.443	2.784	0.408	0.597	0.017	3.570	
	51.61	5.178	.086	.381	2.398	.351	.514	.014	3.075	13.84
Lake Bessemer	63.67	5.460	.040	.295	1.447	.230	.226	.016	1.400	
	55.74	4.779	.035	.258	1.266	.201	.197	.014	1.225	12.46
Lillie	62.55	5.14	.077	.37	2.22	.28	.09	.011	2.40	
	55.61	4.57	.068	.33	1.97	.25	.080	.010	2.13	11.10
Marquette	42.793	35.37	.050	.25	.99	.21	.21	.021	1.67	
	40.251	33.26	.047	.23	.93	.19	.19	.019	1.57	5.94
Norfolk *	55.00	14.25	.055	.17	3.30	.57	.56	.032		
	54.50	14.12	.0544	.168	3.27	.56	.55	.0317		.91
Peninsular	52.00		.080							
	47.8400		.0736							8.00
Princeton No. 1	62.81	5.95	.063	.14	1.25	.80	.68	.004	1.69	
	53.6962	5.0866	.0538	.1196	1.0646	.6839	.5813	.0034	1.4447	14.51
Princeton No. 2	61.63	8.50	.109	.24	1.21	.70	.54	.005	2.60	
	53.1065	7.3244	.0939	.2068	1.0426	.6031	.4653	.0043	2.2404	13.83
Republic Special	67.82	1.30	.021	Trace	.63	.15	.08	.045	.60	
	67.5148	1.2941	.0209	Trace	.6271	.1493	.0796	.0447	.5973	.45
Republic Specular	66.77	2.70	.037	.09	.93	.17	.12	.01	.35	
	66.2558	2.6792	.0367	.0893	.9228	.1686	.1190	.0099	.3473	.77
Republic Kingston	63.84	6.40	.041	.16	1.08	.40	.33	.028	.19	
	63.1505	6.3308	.0405	.1582	1.0683	.3956	.3264	.0276	.1879	1.08
Republic Magnetic (Non-Bess.)	69.00	3.23	.12	.147	.664	.20	.216	.021	.46	
	68.6550	3.128	.1194	.1462	.6606	.1990	.2149	.0208	.4577	.50
Rose	61.05	6.33	.117	.257	2.379	.42	.061	.018	2.96	
	53.66	5.56	.103	.223	2.091	.37	.054	.016	2.62	12.10
Richmond	44.00	35.06	.041	.15	.52	.30	.15	.006	1.50	
	43.12	34.36	.040	.15	.51	.29	.15	.006	1.47	2.00
Salisbury	61.87	5.570	.092	.161	1.807	.262	.147	.014	2.910	
	52.65	4.740	.078	.137	1.537	.222	.125	.011	2.47	14.90
Salisbury Bessemer*	63.60	3.43	.044	.25	1.38	.13	.18	.017	4.45	
	54.11	2.91	.037	.21	1.17	.11	.15	.014	3.78	14.91
Scotch	59.00									
	58.41									1.00
Sheffield	60.45	10.69	.021	.11	1.57	.10	.09	.026	1.03	
	59.0354	10.4396	.0205	.1074	1.5332	.0976	.0878	.0253	1.0058	2.34
Tilden Silica	42.50	37.49	.029	.103	.908	.150	.142	.012	.800	
	41.28	36.41	.028	.100	.882	.145	.137	.011	.777	2.86

MESABA RANGE.

Adams	63.80	3.00	.084	.41	1.17	.12	.05	.002	3.74	
	57.30	2.69	.081	.37	1.05	.11	.04	.0018	3.36	10.19
Admiral	64.20	5.04	.028	.31	.41	.35	.27	.004	2.06	
	59.26	4.65	.026	.29	.38	.32	.25	.004	1.90	7.70
Ainslie	62.47	3.47	.077	.71	2.57	.21	.15	.020	3.17	
	56.65	3.15	.070	.64	2.33	.19	.14	.018	2.87	9.31

Above are average cargo analyses of the season 1899, except when marked thus: *. Ores so marked show the expected analyses for the season 1900.

MINERAL RESOURCES.

Cargo analyses of Lake Superior iron ores, season 1899—Continued.

MESABA RANGE—Continued.

Name of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Loss by ignition.	Moisture.
	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per cent.</i>
Auburn	64.10	2.86	0.049	0.43	1.80	0.53	0.27	0.010	2.44	.....
	56.9400	2.5405	.0435	.3320	1.5989	.4708	.2398	.0089	2.1675	11.17
Audrey	62.15	3.24	.058	.85	1.86	.62	.23	.007	4.00	.....
	54.2383	2.8275	.0506	.7418	1.6232	.5411	.2007	.0061	3.4908	12.73
Beaver	62.66	3.53	.0794	.34	1.92	.20	.13	.015	3.90	.....
	54.865	3.09	.0695	.29	1.68	.17	.10	.013	3.27	12.44
Biwabik	63.56	3.00	.038	.49	.95	.12	.07	.006	3.41	.....
	58.4307	2.7579	.0349	.4504	.8733	.1108	.0643	.0055	3.1348	8.07
Canton	60.95	3.16	.043	.44	.84	.64	.18	Trace.	7.10	.....
	53.6909	2.7836	.0422	.3876	.7400	.5638	.1566	Trace.	6.2544	11.91
Commodore	63.60	4.21	.038	.44	1.21	.34	.12	.007	3.39	.....
	56.73	3.76	.064	.39	1.06	.30	.11	.006	3.02	10.80
Commodore Non-Bess	62.70	4.21	.058	.44	1.29	.34	.12	.006	3.72	.....
	55.80	3.75	.062	.39	1.15	.30	.11	.005	3.31	11.00
Duluth	60.19	5.12	.048	.90	1.24	.15	.08	.011	6.90	.....
	52.30	4.45	.042	.78	1.07	.13	.07	.0096	6.00	13.11
Fayal	63.41	3.15	.085	.63	.81	.42	.19	None.	4.10	.....
	56.8597	2.8246	.0814	.5649	.7263	.3766	.1704	None.	3.6765	10.33
Franklin	62.78	4.85	.040	.49	1.03	.30	.46	.016	3.41	.....
	58.5046	4.5197	.0372	.4566	.9598	.2795	.4286	.0149	3.1777	6.81
Genoa	63.42	3.38	.030	.50	.86	.47	.16	Trace.	3.23	.....
	57.3444	3.0562	.0271	.4521	.7776	.4250	.1447	Trace.	2.9206	9.58
Hale*	60.00	5.00	.080	.55	.52	1.58	.....	.016	.....	.....
	54.00	4.50	.072	.495	.468	1.422	.....	.014	.....	10.00
Hartley	64.74	2.50	.038	.41	1.29	.18	.04	.007	3.10	.....
	57.77	2.23	.034	.37	1.15	.16	.035	.006	2.77	10.76
Hibbing	64.85	2.68	.033	.46	1.40	.14	.13	.009	2.31	.....
	57.92	2.39	.029	.41	1.25	.13	.12	.008	2.06	10.69
Juniata	58.971	.....	.0578	.401	.....	.....	.....	.....	.....	.....
	50.3022	.....	.0493	.3420	.....	.....	.....	.....	.....	14.700
Kanawha*	60.00	5.50	.067	.46	1.10	1.40	.25	.004	2.00	.....
	54.00	4.95	.060	.414	.99	1.26	.225	.004	1.80	10.00
Malta	62.60	4.07	.029	.46	.86	.64	.22	Trace.	2.78	.....
	57.5795	3.7436	.0267	.4231	.7910	.5887	.2024	Trace.	2.5570	8.02
Mountain	62.830	.....	.0474	.307	.....	.....	.....	.....	.....	.....
	58.9640	.....	.0407	.2636	.....	.....	.....	.....	.....	14.111
Oliver	61.893	.....	.0516	.348	.....	.....	.....	.....	.....	.....
	53.2991	.....	.0496	.2996	.....	.....	.....	.....	.....	13.885
Penobscot	61.435	6.44	.0335	.46	1.43	.20	.10	.013	3.39	.....
	53.878	5.64	.0293	.40	1.25	.17	.08	.011	2.97	12.30
Pillsbury	62.32	5.00	.028	.30	1.29	.11	.14	.005	3.80	.....
	56.67	4.65	.025	.27	1.17	.10	.13	.0045	3.46	9.06
Preble	59.400	.....	.0840	1.345	.....	.....	.....	.....	.....	.....
	51.7718	.....	.0732	1.1722	.....	.....	.....	.....	.....	12.842
Roberts	61.35	7.46	.028	.44	1.07	.46	.19	.008	1.97	.....
	55.78	6.77	.0254	.40	.973	.418	.173	.007	1.79	9.08
Sauntry*	62.50	4.75	.069	.30	1.90	.19	.11	.01	.....	.....
	56.25	4.27	.062	.27	1.71	.17	.099	.009	.....	10.00

Above are average cargo analyses of the season 1899, except when marked thus: *. Ores so marked show the expected analyses for the season 1900.

IRON ORES.

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Cargo analyses of Lake Superior iron ores, season 1899—Continued.

MESABA RANGE—Continued.

Name of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Loss by ignition.	Moisture.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per cent.
Sellers.....	63.95	3.82	.089	.46	1.29	.17	.13	.082	2.45	.....
	57.72	3.45	.035	.42	1.16	.15	.12	.029	2.21	9.74
Sparta.....	64.08	3.90	.080	.37	.84	.53	.15	.006	1.57	.....
	59.0561	3.5942	.0276	.3410	.7741	.4884	.1382	.0055	1.4469	7.84
Stevenson*.....	63.40	5.10	.040	.32	.62	.24	.18	.009	3.20	.....
	57.06	4.59	.086	.288	.558	.216	.162	.008	2.88	10.00
Top Brown.....	61.26	4.04	.065	1.30	1.29	.55	.15	.007	4.85	.....
	55.2443	3.6433	.0586	1.1723	1.1633	.4960	.1353	.0063	3.9228	9.82
Vulcan.....	62.55	4.27	.042	.94	.....	.....	.....	Trace.	.....	.....
	57.0018	3.8913	.0883	.8566	.....	.....	.....	Trace.	.....	8.87
West Drift.....	63.84	2.51	.052	.72	.....	.....	.....	Trace.	.....	.....
	57.7688	2.2713	.0471	.6515	.....	.....	.....	Trace.	.....	9.51

VERMILION RANGE.

Chandler.....	64.43	4.20	.040	.22	2.20	.63	.14	.002	.90	.....
	60.9250	3.9715	.0878	.2080	2.0802	.5657	.1324	.0019	.8510	5.54
Jura.....	62.142	.....	.0760	.....	.....	.....	.....	.....	.....	.....
	57.5565	.....	.0708	.....	.....	.....	.....	.....	.....	7.379
Long Lake.....	60.47	7.67	.044	.13	3.65	.86	.28	.012	1.45	.....
	56.1948	7.1277	.0409	.1208	3.3919	.7992	.2802	.0112	1.3475	7.07
Pioneer.....	63.506	.....	.0422	.....	.....	.....	.....	.....	.....	.....
	58.4534	.....	.0888	.....	.....	.....	.....	.....	.....	7.956
Red Lake.....	63.72	4.08	.131	.09	2.01	1.02	.34	.022	.80	.....
	61.8976	3.9633	.1273	.0874	1.9525	.9908	.3303	.0214	.7771	2.86
Savoy.....	63.452	.....	.0479	.....	.....	.....	.....	.....	.....	.....
	58.9887	.....	.0445	.....	.....	.....	.....	.....	.....	7.034
Vermilion.....	66.22	2.55	.127	.06	1.04	.92	.30	.007	.45	.....
	65.2598	2.5130	.1252	.0591	1.0249	.9067	.2957	.0069	.4435	1.45
Vermilion, Special...	66.43	2.60	.067	.04	.85	.63	.30	Trace.	.30	.....
	65.3987	2.5594	.0656	.0394	.8367	.6202	.2953	Trace.	.2953	1.56
Zenith.....	64.715	.....	.0403	.....	.....	.....	.....	.....	.....	.....
	61.0378	.....	.0380	.....	.....	.....	.....	.....	.....	5.682

Above are average cargo analyses of the season 1899, except when marked thus: *. Ores so marked show the expected analyses for the season 1900.

THE IRON ORE INDUSTRY OF THE VARIOUS STATES DURING 1899.

MICHIGAN.

Michigan continues to hold first place as a producer of iron ore, and the only State which is likely to contest this position in the near future is Minnesota.

The amount contributed by Michigan in 1899, 9,146,157 long tons, was 37.1 per cent of the total for the United States, practically the same proportion as in 1898, when but 7,346,846 long tons were mined. The increase on the 1898 record was 1,799,311 long tons, or 24.5 per cent. Of the product in 1899 8,863,942 long tons, or 96.9 per cent, was

red hematite, 237,570 long tons, or 2.6 per cent, magnetite, and 44,645 long tons, or 0.5 per cent, brown hematite.

The State ranked first as a producer of red hematite, fourth in the list of magnetite producers, and eighth in the supply of brown hematite.

The total value of the 9,146,157 tons of ore mined was \$13,707,899, or \$1.50 per ton. This is the value for the ore at the mine, not including transportation.

Owing to the great demand for iron ores, some deposits which had been classed as abandoned, or were temporarily inactive, were again exploited and exploration work was quite active. Lean Bessemer ores, and also some relatively high phosphorus ores, were shipped, which in previous years could not have been marketed, but these aided in swelling the total production of the State in 1899.

The semicentennial celebration of the Cleveland Cliffs Company, at Ishpeming, emphasizes the marvelous development which has made the Lake Superior region famous. The Cleveland mine was one of the pioneer enterprises which in fifty years has resulted in a mining industry unequaled in the history of the world.

Among the efforts made to obtain value from lean material necessarily mined is the ore-concentrating plant at the Pewabic mine, described by Mr. L. M. Hardenburgh. The material treated consists of fragmental iron ore varying from the size of a pea to pieces weighing 200 pounds, carried in soft sandstone. The distribution is reported to be fairly uniform, but occasional pockets are found containing several tons of clean ore. The ore being much harder than the sandstone, the amount of fine ore resulting from mining and crushing is comparatively small. As there is no cementing of the ore to the sandstone, the ore breaks free from the rock, and no middle product containing rock with more or less ore results. The lean ore from the open cut and mine drifts is fed over a grizzly, the fine material passing through and the balance being discharged onto a picking table, where about 20 per cent of the ore is obtained by hand sorting. The ore and sandstone remaining on the table go to a crusher, and then to rolls set to crush to three-fourths-inch size. The crushed ore is then screened and passed through Hartz jigs. Four sizes of ore are produced, the bulk being between seven-eighths and one-half inch in size. The smallest size is that which passes over a 20-mesh screen. The capacity of the mill is from 280 to 390 tons of raw material per day.

MINNESOTA.

All of the 8,161,289 long tons of iron ore contributed by Minnesota was of the red hematite variety, in which class the State occupied second place, with the same rank in the list of iron ore producers. The

increase was 2,197,780 long tons, or 36.9 per cent, over the 1898 total of 5,963,509 long tons.

On both the Mesabi and Vermilion ranges exploration work has been carried on, and the claim is made that the reserves on the Mesabi range represent double the quantity of iron ore which has been mined from the Lake Superior region in its history of fifty years.

The use of steam shovels at some of the large deposits of the Mesabi range and the prominence given to these by published articles has resulted in a widespread opinion that most of the Mesabi ore is won in this way. Such, however, is not the case, for some of the largest producers win the ore from underground exploitations.

The handling of the stripping and of the ore by steam shovels at the important mines has reached a degree of perfection which is most creditable. A record of 6,000 tons of ore dug and loaded by one machine in nine hours indicates what can be done under favorable conditions, but it would be unfair to gage a season's work by this or by shorter records, when from 9 to 12 tons per minute were placed upon cars. The statement on the following pages concerning the product of important mines in 1899 will show that the combined output of three of the Mesabi mines operated by steam shovel approximated 2,500,000 tons, which is a better index of possibilities.

ALABAMA.

A total of 2,662,943 tons of iron ore contributed by this State in 1899 gave it third place as a producer, this amount being 261,195 tons, or 10.9 per cent, in excess of the quantity mined in 1898. Of the total product in 1899, 1,911,097 tons, or 71.8 per cent, was red hematite, and 751,846 tons, or 28.2 per cent, brown hematite.

Alabama occupies third position as a producer of red hematite, and second rank as a miner of brown hematite.

Dr. William B. Phillips, in an article in the American Manufacturer, states that in the construction of the waterworks tunnel through Red Mountain, near Birmingham, Alabama, the various seams of iron ore that are mined in the district were cut through at a depth of 150 feet below the crest of the ridge and the foot and hanging walls penetrated. The uppermost seam was the Ida seam, 6 feet in thickness; underneath it was 25 feet of lean ore and sandstone; then the Irondale seam, 3 feet thick; then 41 feet of red sandstone with slate partings; then the Big seam, sometimes called the Eureka or Ishkooda seam, 21 feet thick; under this was reddish sandstone, and finally bluish slates and magnesian limestone to the base of the hill. Of these three seams the Ida is not worked at all, the Irondale is not worked southwest of Red Gap, and the Big seam is not worked northeast of Grace's Gap, which is 4 miles southwest of the tunnel.

The Irondale seam, worked by the Sloss Iron and Steel Company, northeast of Red Gap, affords the best soft red ore on the mountain, the average content of metallic iron being about 52 per cent, but the alumina is also above the average for the district.

One of the companies in the district striving for a supply of soft red ore has undertaken to use the lower bench of the Big seam below Grace's Gap. The upper 10 feet have long since been removed, and now the other part of the seam is to be taken, although the metallic iron will not exceed 40 per cent, and the lime is very low.

At the time of writing the article Dr. Phillips summarized the ore situation in the Birmingham district as follows:

The cheap soft red ore, carrying from 45 to 50 per cent of iron and comparatively free from lime, is nearly exhausted; more and more of the limy ore, which costs more to mine and more to smelt, is being used, and there is a great and pressing demand for brown hematite ores to take the place of the soft red ore.

PENNSYLVANIA.

In 1899 Pennsylvania increased the 1898 total of 773,082 long tons by 236,245 long tons, or 30.6 per cent, reaching a production of 1,009,327 long tons.

All four classes of ore were mined, 815,771 long tons, or 80.8 per cent, being magnetite, chiefly from the Cornwall ore hills; 152,468 tons, or 15.1 per cent, brown hematite; 38,331 tons, or 3.8 per cent, was red hematite, and 2,757 tons, or 0.3 per cent, carbonate.

The State occupied first position as a miner of magnetite, sixth place as a producer of brown hematite, eighth rank in supplying red hematites, and fourth as a contributor of carbonate.

VIRGINIA AND WEST VIRGINIA.

West Virginia mined a small quantity of ore in 1899, but to preserve the confidential nature of the statements this has been included in Virginia report, and practically all of the ore is to be credited to the latter State.

In 1899 these States contributed 986,476 long tons, being 428,763 tons, or 76.9 per cent, greater than the 1898 output of 557,713 tons. They take first rank as brown hematite producers, with a total of 968,143 long tons, more than one-third of the nation's output and 98.2 per cent of the State's total. The balance, 17,173 tons, or 1.7 per cent, was red hematite, and 1,160 tons, or 0.1 per cent, magnetite.

Mr. Charles Catlett, in a recent paper,¹ presents some notes regarding the brown hematite iron ore deposits in the Potsdam formation, along the eastern side of the Valley of Virginia and north of Roanoke, from which the following is excerpted:

The Blue Ridge consists, in ideal section, of the older crystalline rocks to the east, overlain by flags and conglomerates and sandstones, with heavily bedded white quartzite ridges commonly marking its western border. Overlying this quartzite,

¹ Trans. Am. Inst. Mining Engineers, 1899.

and usually (by reason of their soft character) occurring only as foothills, are heavy beds of clay and partially decomposed shale. These are, in turn, overlain by the characteristic limestone of "The Valley."

The irregularities in thickness, folding, and erosion bring the older rocks close to the valley at some places, while at others they are separated from it by a great expanse of the stratified formations.

All of the formations above referred to contain more or less iron ore, but the heavy clays and shales overlying the quartzite are the repository of beds of iron ore, which, by their extent and persistency, mark this as one of the two great ore-bearing formations in Virginia. The ores of this formation are found over a distance of 150 miles or more, in a greater or less state of development, along a definite horizon. The soft nature of the inclosing strata and the absence of any distinctly marked foot or hanging wall have no doubt contributed largely to the irregularity of the bed from point to point, and often render exceedingly difficult the determination of its exact position and the problem of its practical development.

The average of a series of analyses made by Dr. A. S. McCreath from his own sampling gives to these ores:

Average composition of some Virginia iron ores.

	Per cent.
Iron.....	48.646
Phosphorus.....	.259

These samples were taken from the surface workings. As a rule the ores have been found to improve somewhat in quality and to become more massive at a short distance below the surface.

At times the ores become highly manganiferous, and deposits of manganese ore are also found in this formation closely associated with the iron ore. In some places the manganese ore seems to exclude the iron ore.

There are few mines of any extent based upon these ores from Roanoke northward. The most celebrated operations near Roanoke are the Rorer mines, just south of the city; the Upton mines, of the Crozer company, about 12 miles east of the city, and mines adjoining these, known as the Lynchburg mines.

The Crozer mines consist of two open cuts of great magnitude, in which the indication of the displaced and broken division of the vein is very apparent. While there is a good deal of good ore, much is lean, and there is a large amount of dead material handled, which necessarily more or less contaminates the ore.

One of the mines near Roanoke averages 42 per cent iron; another 45 per cent. The general opinion of those using the ores from the mines near Roanoke is that as mined and handled they will not average over 42 or 43 per cent, and it is unsafe to assume that the ores of these measures in large quantities, and under the ordinary method of mining and washing, will run higher in iron than between 42 and 43 per cent.

The chemists at all the furnaces and mines agree that these ores could be improved by better picking, by jigging, and by excluding well-recognized lean ore, which, under present conditions of operating, the miner can not afford to throw away; but it is difficult to say how much the ore could be improved.

Most of the silica occurs combined in silicates representing all grades from pure clay up to a clayey iron ore.

The phosphorus in the ores near Roanoke runs high, varying from 0.6 to 0.9 per cent. In the mines farther north the amount seems to be less. The ore from the

mines near Vesuvius varies as a whole between 0.2 and 0.4 per cent, but considerable quantities of ore can often be found quite low in phosphorus. The manager of the Shenandoah Iron Works reports that the phosphorus in the ore used varies between 0.2 and 0.25 per cent.

One dollar per ton of concentrated ore is assumed as a safe estimate of cost when operations are carried on with sufficient capital to permit economic work.

In these ores the impurity consists of a tough clay, requiring an excess of water, and making it difficult to wash the ore thoroughly. This, and the fact that water is often scarce, makes the washing often inadequate. There could be, therefore, a decided improvement in this respect.

As developed near Roanoke, these ores carry more manganese and phosphorus than is desired; consequently all the furnaces use other ores as "mixers."

This description could be applied to a larger territory and embrace many of the brown hematite deposits along the Blue Ridge and South Mountain, in Pennsylvania, Maryland, the Virginias, North Carolina, Georgia, Tennessee, and Alabama.

TENNESSEE.

Tennessee's total of 632,046 long tons gave it sixth position in 1899, and exceeded its product of 593,227 tons in 1898 by 38,819 tons, or 6.5 per cent. Of the amount mined, 333,342 tons, or 52.7 per cent, was brown hematite, and 298,704 tons, or 47.3 per cent, red hematite, the State occupying, respectively, third and fifth rank in these classes of ore.

WISCONSIN.

The output of Wisconsin in 1898 (509,645 long tons) was increased 70,153 tons, or 13.8 per cent, in 1899, reaching a total of 579,798 tons, and giving the State seventh place in rank. Of this total, 531,636 long tons, or 91.7 per cent, was red hematite, obtained chiefly from the Gogebic Range of the Lake Superior region, in which class it occupied fourth place, and 48,162 tons, or 8.3 per cent, brown hematite, giving it seventh place in the production of this variety of ore.

NEW YORK.

New York was the only State except Pennsylvania which mined all four varieties of iron ore in 1899. Of the total of 443,790 long tons, 344,159 tons, or 77.5 per cent, was magnetite, 45,503 tons, or 10.3 per cent, red hematite, 31,975 tons, or 7.2 per cent, brown hematite, and 22,153 tons, or 5 per cent, carbonate ores. In the different classes of ore New York occupied, respectively, second, seventh, ninth, and second positions.

The increase, 263,839 tons, was nearly one and a half times the output of 179,951 long tons in 1898.

COLORADO.

Colorado's total of 307,557 long tons in 1899 gave it ninth place as an ore producer, being a decrease of 10,923 long tons, or 3.4 per cent, from the 318,480 tons contributed in 1898.

Of the amount mined in 1899, 295,230 long tons, or 96 per cent, was brown hematite, and 12,327 tons, or 4 per cent, was red hematite. The decrease in Colorado's production was largely influenced by the opening of ore deposits in Wyoming and New Mexico for the use of the blast furnaces of the Colorado Fuel and Iron Company, and by the use of liberal amounts of lead ores from Idaho in the Colorado silver smelters.

NEW JERSEY.

New Jersey's contribution in 1899 was 256,185 long tons of magnetite ore, in which class it occupied third position. This was a decrease of 19,253 long tons, or 7 per cent, from the output of 275,438 tons in the preceding year.

The expense of mining some of the New Jersey ores and the necessity of roasting or concentrating the mineral interferes with the exploitation of its mines, but there are liberal ore reserves which, if properly prepared, may contribute to a local supply for near-by furnaces at prices per unit of iron below the cost of ores brought from Lake Superior or imported from foreign countries.

The use of the clinker resulting from roasting franklinite—an ore of zinc, manganese, and iron—is referred to in the report on manganese.

GEORGIA.

This State supplied 236,748 long tons of iron ore in the year 1899. Of this amount 179,748 tons, or 75.9 per cent, was brown hematite and 57,000 tons, or 24.1 per cent, red hematite, giving it fifth and sixth place in these classes of ore. The production shows an increase of 76,665 long tons, or 47.9 per cent, over the 160,083 tons mined in 1898, when Georgia and North Carolina were reported together.

In the summer of 1899 Mr. S. W. McCallie, assistant State geologist, made an examination of the brown hematite ores of Georgia, which are found mainly in the northwestern part of the State, in what is known as the Paleozoic area. He reports that the ores occur chiefly in the Lower Silurian formation, but are also found associated with the Carboniferous and the Cambrian deposits. The most abundant iron deposits of the Lower Silurian are in the Knox dolomite series. This magnesian formation often contains an abundance of chert, and usually gives rise to low, well-rounded ridges, along which the iron-ore deposits occur. The ore is found in pockets or irregular deposits in the residual clays that have resulted from the weathering of the magnesian limestones. In connection with these ores more or less chert and manganese are frequently found. The extent of the deposits is variable, in some cases only a few tons being obtained, while in others several thousand carloads have been won. Where the ore was found in large quantities the former method of mining was by means of shovel, pick, and screen, but at present these have been superseded by

steam shovels and log washers, greatly reducing the cost. The screen method of working the ores is still adopted where the banks are small or unfavorably located for obtaining water for washing. This method is wasteful, however, the fine-grained ore being left on the dumps, and some of these old dumps are now profitably reworked by means of the log washer.

The ore is generally won in open cuts varying from 5 to 60 feet in depth, or to water level. The extent of the ore bodies varies greatly in depth in different localities. At Oredell a bore hole showed the ore to extend to a depth of more than 175 feet, while valuable deposits near Cedartown have been worked to a depth of 70 feet without apparent decrease in richness. The ore deposit is often interrupted by huge masses of white or vari-colored clay "horses."

The locations of the ore deposits are as a rule indicated by the occurrence of more or less float on the surface; but the abundance of the float ore is not always a criterion of the quantity of ore beneath, as one of the best deposits in the vicinity of Cedartown had a remarkably poor surface prospect.

The ores of the Knox dolomite series show 48.45 to 51.10 per cent metallic iron, from 0.20 to 5.60 per cent manganese, from 2.40 to 7.87 per cent silica, and from 0.147 to 0.58 per cent phosphorus.

The iron ores of the Cambrian formation occur associated with sandstone, mica schists, and slates. They have been worked extensively in Bartow County, where they occur in the vicinity of what is known as the Cartersville fault, which is the line of demarcation between the crystalline and Paleozoic areas. The Cambrian brown ores differ somewhat in their character and mode of occurrence from those of the Knox dolomite series. In some cases these ores have been metamorphosed, and in a few instances partake of the nature of a true hematite. The ore deposits near Emerson often assume the character of true veins, and vary in thickness from a few feet to several rods. At the Wheeler mine the ore is variable in thickness, and has been worked along the outcroppings for nearly one-fourth of a mile, and to a depth, in places, of 40 feet or more.

In the northern part of Bartow County, in the Sugar Hill district, the ores partake of the nature of a blanket deposit, and are found principally in the residual clays and partially decomposed slates overlying the sandstone. These blanket deposits are valuable on account of their richness and the cheapness with which they can be mined. In other localities in the neighborhood of Buford the ores occur in pockets and irregular deposits, as in the Knox dolomite series.

The Cambrian ores are always free from cherty material, but this impurity is frequently replaced by siliceous material in the form of sandstone, which renders the chemical analyses of the Knox dolomite and the Cambrian ores very similar in character.

The Carboniferous ores occur chiefly in the lower division of this formation, associated with the Fort Payne chert. These deposits have been more or less extensively worked along the eastern foothills of the Horn Mountain, in Sugar Valley. They are also reported to occur upon the western side of Big Texas Valley. These deposits are apparently not so extensive or valuable as the Knox dolomite or Cambrian deposits, nevertheless are of considerable economic importance.

Besides the brown ore deposits of the Paleozoic area, there are also to be found in the crystalline area along the Atlanta, Knoxville and Northern Railroad valuable deposits of brown ores, which are practically undeveloped. The more extensive mining operations are confined mainly to Polk and Bartow counties.

OTHER STATES.

None of the remaining States mined 100,000 tons of iron ore in 1899. Nevada, New Mexico, Utah, and Wyoming contributed red and brown hematite and magnetite ore. Ohio's output was all of the carbonate variety, in which class it occupied first place. North Carolina mined brown hematite and magnetite, Kentucky red hematite, Connecticut and Massachusetts brown hematite, Missouri red and brown hematites, Texas brown hematite, and Maryland carbonate ores.

Active exploitation of the red-hematite deposit near the Platte River, in northeastern Wyoming, was inaugurated in 1899, but the railroad connections to Sunrise were not completed until the spring of 1900. It is probable that Wyoming will rank as an important producer of iron ore in the report for 1900.

VALUE OF IRON ORES.

The total value at the mines of the 24,683,173 long tons of iron ore produced in the year ending December 31, 1899, as reported by producers, was \$34,999,077, or \$1.42 per long ton, an increase of 28 cents, or 24.6 per cent, over the average value of \$1.14 per ton, as given in 1898.

The highest average value placed on iron ore at the mines is for the State of New Jersey. There the expense of mining is considerable, and as the ores do not have long hauls to reach the blast furnaces they command a higher price per ton at the mine than many other ores. The lowest average cost, 90 cents per ton, was in Texas, where a portion of the iron ore is produced by convict labor.

The following table will show the production and total value, together with the value per ton, of the iron ore mined in the United States in 1899, reported by States. This valuation does not represent either the cost or the selling price of ores, but in many cases is the selling price less the cost of transportation from the mines to points of consumption.

Value of iron ore mined in 1899, by States.

State.	Production.	Total value.	Value per ton.
	<i>Long tons.</i>		
Michigan	9, 146, 157	\$13, 707, 899	\$1. 50
Minnesota	8, 161, 289	9, 924, 853	1. 22
Alabama	2, 662, 943	2, 601, 609	. 98
Pennsylvania	1, 009, 327	1, 991, 772	1. 97
Virginia and West Virginia	986, 476	1, 766, 410	1. 79
Tennessee	632, 046	694, 372	1. 10
Wisconsin	579, 798	837, 766	1. 44
New York	443, 790	1, 241, 985	2. 80
Colorado	307, 557	749, 734	2. 44
New Jersey	256, 185	814, 920	3. 18
Georgia	236, 748	235, 343	. 99
Nevada, New Mexico, Utah, and Wyoming	54, 148	108, 720	2. 01
Ohio	53, 221	77, 606	1. 46
North Carolina	47, 616	72, 622	1. 53
Kentucky	35, 384	35, 384	1. 00
Connecticut and Massachusetts	29, 611	77, 989	2. 63
Missouri	22, 720	42, 203	1. 86
Texas	14, 729	13, 262	. 90
Maryland	3, 428	4, 628	1. 35
Total	24, 683, 173	34, 999, 077	1. 42

STOCKS.

The stock of ore on hand at the various mines in the United States on December 31, 1899, was 2,320,278 long tons, a decrease of 526,179 tons, or 18.5 per cent, from the amount on hand at the same date in 1898, viz, 2,846,457 long tons. With the exception of seven States, all show a smaller amount of ore on hand in 1899 than in 1898.

As the major portion of the iron ore in the Lake Superior region is sent forward by water before the close of lake navigation, the ore, which is necessarily taken out in winter, is stocked at the mines to await the resumption of traffic in the spring. It is therefore the States of Michigan, Minnesota, and Wisconsin which report the greatest stocks of ore, these three having on hand December 31, 1899, 1,905,148 long tons, or 82.1 per cent of the total reported. The large stock on hand in Missouri is, as previously stated, owing to lean ore, won in previous years, which was not then marketable without further

treatment, but which is being sold. In the Southern States but little ore is stocked, most of it being shipped directly to blast furnaces as soon as mined.

The table given below will show the stocks of ore on hand at the mines at the close of the year 1899, by States:

Stocks of iron ore on hand December 31, 1899.

State.	Stock.
	<i>Long tons.</i>
Michigan	1, 100, 419
Minnesota	719, 529
Missouri	150, 774
Wisconsin	85, 200
New York	67, 613
Alabama	46, 739
Pennsylvania	25, 720
Tennessee	24, 053
New Jersey	23, 484
Ohio	22, 250
Virginia and West Virginia	13, 850
Texas	12, 500
Nevada, New Mexico, Utah, and Wyoming.....	11, 000
Kentucky	8, 200
Connecticut and Massachusetts.....	4, 034
Georgia	2, 350
Colorado	1, 355
North Carolina.....	844
Vermont	300
Maryland.....	64
Total	2, 320, 278

PROMINENT IRON-ORE PRODUCERS.

The concentration of effort by combining adjacent mines and working them on a liberal scale was more pronounced in 1899 than in previous years. During the year ending December 31, 1899, ninety operations produced 21,788,169 long tons, or 88.3 per cent of the total amount mined in that year. This represented an average output of 242,091 tons per mine.

Of the prominent producers tabulated four contributed over 1,000,000 tons each, three between 700,000 and 800,000 tons, three between 600,000 and 700,000 tons, two between 500,000 and 600,000 tons, four between 400,000 and 500,000 tons, four between 300,000 and 400,000 tons, nine

between 200,000 and 300,000 tons, thirty between 100,000 and 200,000 tons, and thirty-one between 50,000 and 100,000 tons. Of these large mines 35 were located in Michigan, 22 in Minnesota, 13 in Alabama, 4 each in Tennessee, Virginia, and Wisconsin, 3 in New York, 2 in New Jersey, and 1 each in Colorado, Georgia, and Pennsylvania.

Sixty-six of these large operations mined red hematite, contributing 18,754,219 long tons; 15, brown hematite, with a total of 1,403,498 tons; 7, magnetite, yielding 1,302,497 tons, while the remaining 2 produced mixed magnetite and red hematite with a total of 327,955 long tons.

In the following table will be found the names of those operations which produced over 50,000 long tons in 1899, the management of which gave permission for such publication, those grouped together at the end of the table representing mines whose production was reported but whose names are withheld because of lack of permission to publish in this connection.

List of prominent iron-ore producers in 1899.

Name.	Product.
	<i>Long tons.</i>
Red Mountain Group, Alabama.....	1, 144, 382
Mountain Iron and Rathbun, Minnesota.....	1, 137, 182
Fayal, Minnesota.....	1, 059, 000
Norrie, East Norrie, North Norrie, Pabet, Oliver Iron Mining Company, Michigan.....	1, 049, 066
Cornwall, Pennsylvania.....	763, 152
Mahoning No. 3, Minnesota.....	750, 661
Lake Superior, Michigan.....	700, 635
Chapin, Michigan.....	681, 525
Adams, Minnesota.....	665, 215
Chandler, Minnesota.....	648, 296
Biwabik, Minnesota.....	553, 836
Pewabic, Michigan.....	507, 811
Tilden, Michigan.....	484, 784
Cleveland Hard Ore and Cleveland Lake, Michigan.....	470, 581
Pittsburg and Lake Angeline, Michigan.....	452, 800
Minnesota Iron Company, Minnesota.....	441, 000
Auburn, Minnesota.....	391, 782
Regent Iron Company, Michigan.....	386, 853
Pioneer, Minnesota.....	381, 303
Aragon, Michigan.....	336, 534
Genoa, Minnesota.....	260, 526

List of prominent iron-ore producers in 1899—Continued.

Name.	Product.
	<i>Long tons.</i>
Ludington, Michigan	253, 427
Cliff's Shaft, Michigan	250, 252
Sparta Iron Company, Minnesota.....	237, 145
Sloes, Alabama	222, 683
Penn Iron Mining Company, Michigan	219, 445
Newport, Michigan.....	219, 378
Orient, Colorado	198, 347
Brown Mining Company, Tennessee	193, 560
Champion, Michigan	186, 487
Commodore, Minnesota.....	183, 479
Marquette Ore (open pit), Michigan	171, 718
Palms, Michigan	168, 308
Aurora, Michigan	167, 834
Duluth, Minnesota	163, 986
Crystal Falls, Michigan	158, 824
Sellers, Minnesota	158, 381
Republic and West Republic, Michigan	141, 468
Salisbury, Michigan	137, 436
Franklin, Minnesota.....	131, 366
Montreal, Wisconsin.....	129, 754
Ashland, Michigan	125, 547
Columbia, Michigan	125, 141
Georgia Iron and Coal Company, Georgia.....	123, 176
Old and New Bed, New York.....	115, 220
Commonwealth, Wisconsin.....	112, 300
Pillsbury, Minnesota.....	111, 831
Hemlock River, Michigan.....	109, 026
Port Henry Iron Ore Company No. 21, New York.....	107, 963
Tecumseh, including State Line and Baker, Alabama.....	103, 378
Cundy, Michigan.....	100, 048
Savoy and Sibley, Minnesota	97, 081
Colby, Michigan.....	94, 708
Penobscot, Minnesota.....	93, 294
Clifford, Michigan.....	93, 025
Greeley Group, Alabama.....	91, 896
Florence, Wisconsin	88, 932
Richards, New Jersey.....	87, 523
Mansfield, Michigan	83, 860
Clare (now Bristol), Michigan.....	83, 365

MINERAL RESOURCES.

List of prominent iron-ore producers in 1899—Continued.

Name.	Product.
	<i>Long tons.</i>
Longdale, Virginia.....	80,452
Lawrence Ore Bank, Tennessee.....	79,829
Zenith, Minnesota.....	76,304
Iron Belt, Wisconsin.....	75,527
Rust, Minnesota.....	69,530
Lamont, Michigan.....	69,303
Champion, Alabama.....	68,586
Wharton Hibernia, New Jersey.....	66,591
Loretto, Michigan.....	64,824
Irondale, Alabama.....	58,824
Raimund, Alabama.....	58,135
Roberts Mining Company, Minnesota.....	57,847
Total.....	19,733,268
18 mines not reported by names.....	2,054,901
Total.....	21,788,169

This table shows that the twelve mines which in 1899 each produced over a half million tons of ore contributed 40 per cent of the total ore taken during the year from all of the iron mines in the country.

TRANSPORTATION.

As most of the ore from the Lake Superior region is sent forward to lower lake ports by vessel, the railroad companies connecting the mines with Lakes Superior and Michigan, to reduce the cost of unloading cars and give the boats their cargoes promptly, have constructed large shipping docks, a detailed list of which was given in the report for 1898. These docks are located at the ports of Escanaba, Marquette, and Gladstone, in the State of Michigan; Two Harbors and Duluth in Minnesota, and Ashland and Superior in Wisconsin. All of these ports are on Lake Superior, with the exception of Escanaba and Gladstone, which are on Lake Michigan.

In 1899 Two Harbors was the banner shipping port, with a total of 8,973,733 long tons forwarded from the Vermilion and Mesabi ranges. Escanaba, which stood second, sent down 3,720,218 tons from the Marquette and Menominee ranges. Duluth's quota of 3,509,965 tons is all credited to the Mesabi range. Marquette shipped 2,733,596 tons mined from the Marquette range, and Ashland obtained its

2,703,447 tons from the Gogebic range. Superior and Gladstone each shipped relatively smaller quantities of ore, but each of them handled large amounts.

The following table will show the shipments of iron ore from the upper lake shipping ports for the years 1892 to 1899 (the figures being collected by the Iron Trade Review), with the all-rail shipments added to indicate the total amount forwarded.

The Duluth, Missabe and Northern Railroad is building a new dock at Duluth, having a capacity of 40,320 tons, the Eastern Minnesota Railroad one at Superior with a capacity of 65,000 tons, and the capacity of the two docks building at Escanaba, Michigan, and Michipicoton, Canada, is about 45,000 tons.

Lake shipments of iron ore.

Shipping port.	1899.	1898.	1897.	1896.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Escanaba	3,720,218	2,803,513	2,302,121	2,321,931
Two Harbors	3,973,733	2,693,245	2,651,465	1,813,992
Duluth	3,509,965	2,635,262	2,376,064	1,988,932
Ashland	2,703,447	2,391,088	2,067,637	1,566,236
Marquette	2,733,596	2,245,965	1,945,519	1,564,813
Superior	878,942	550,403	531,825	167,245
Gladstone	381,457	335,956	341,014	220,887
Total	17,901,358	13,655,432	12,215,645	9,644,036
All-rail shipments...	350,446	369,241	253,993	290,792
Grand total...	18,251,804	14,024,673	12,469,638	9,934,828

Shipping port.	1895.	1894.	1893.	1892.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Escanaba	2,860,172	1,644,776	2,048,681	4,010,085
Two Harbors	2,118,156	1,373,253	903,329	1,165,076
Duluth	1,598,783	1,369,252	440,592	-----
Ashland	2,350,219	1,738,590	1,117,520	2,223,684
Marquette	1,079,485	1,424,850	1,086,934	1,026,338
Superior	117,884	-----	80,273	4,245
Gladstone	109,211	79,108	203,589	115,886
Total	10,233,910	7,629,829	5,880,918	8,545,314
All-rail shipments...	195,127	118,394	178,037	525,768
Grand total...	10,429,037	7,748,223	6,058,955	9,071,082

The difference between total shipment, 18,251,804 tons, less the total production, 17,802,955 tons, represents the apparent decrease in stocks at the mines. This is also influenced by the record of production covering the calendar year, while shipments seldom extend beyond the last of November.

To reach the lake shipping ports the iron ores from the different ranges are transported varying distances, according to the range from which they are obtained and the railroad over which they are carried.

The Mesabi ores are transported from 71 to 106 miles to Duluth and Superior, or from 58 to 70 miles to Two Harbors. The Vermilion range ores, all of which are shipped from Two Harbors, are brought distances varying from 68 to 87 miles. The Marquette iron ores are carried 12 to 36 miles to Marquette, or 62 to 81 miles to Escanaba. The Gogebic ores are sent from 39 to 59 miles to Ashland, or 67 to 89 miles to Escanaba. The Menominee iron ores are shipped at Escanaba, to reach which they are transported from 43 to 72 miles by railroad.

To illustrate the distance which the iron ore from the Lake Superior region is transported the following table has been prepared from United States Government reports showing the number of statute miles which vessels necessarily cover in going from the various shipping ports on the upper lakes to the receiving ports on Lake Erie, where the major portion of the ore is delivered, and also to Chicago and Milwaukee on Lake Michigan, important consuming points which are directly reached by water.

From the table it will be seen that Duluth and Superior are the most distant from the receiving ports, the other shipping docks being, respectively, the following distances nearer to the ports of Lake Erie, as follows:

Differences in distance from lake shipping ports to ports on Lake Erie.

	Miles.
Two Harbors, Minnesota	24
Ashland, Wisconsin	46
Marquette, Michigan	236
Escanaba, Michigan	286

There is also the same difference in distance to Chicago and Milwaukee, with the exception of Escanaba, which is 532 and 551 miles nearer these cities than Duluth or Superior.

Distance in statute miles between lake iron ore shipping and receiving docks.

To—	From—				
	Duluth and Superior.	Two Harbors.	Ashland.	Marquette.	Escanaba.
Lake Erie ports:	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>
Buffalo	985	961	939	749	699
Erie	917	893	871	681	631
Conneaut.....	889	865	843	653	603
Ashtabula.....	876	852	830	640	590
Fairport.....	851	827	805	615	565
Cleveland	834	810	788	598	548
Lorain	814	790	768	578	528
Huron	805	781	759	569	519
Sandusky	800	776	754	564	514
Toledo	784	760	728	548	498
Lake Michigan ports:					
Chicago	809	785	763	573	277
Milwaukee	743	719	697	507	192

Gladstone is near and to the north of Escanaba, but the distance to lower lake is practically the same as from Escanaba.

In the statistics of the Sault Ste. Marie Canal for 1899 will be found cargo records of some of the largest vessels carrying iron ore. The steamer *Mahietoa* moved 8,215 net tons in one cargo, the steel tow barge *John Smeaton* moved 8,339 net tons in a single cargo. The steamer *Presque Isle* during the season received and discharged 187,816 net tons, the steamer *Andrew Carnegie* covered 42,027 miles during the season, and the steamer *H. W. Oliver* is computed to have carried 141,475,588 mile tons during the season.

Ten steel vessels of the largest size had average cargoes throughout the season of 7,385 net tons, 18 averaged 6,423 tons, 19 averaged 5,420 tons, 13 averaged 4,525 tons, 114 averaged 3,404 tons, and 74 averaged 2,511 tons. Of the tow barges 4 averaged 8,179 net tons, 9 averaged 6,404 net tons, 13 averaged 5,790 tons, 9 averaged 4,445 tons, 25 averaged 3,552 tons, and 35 averaged 2,309 tons.

During the year 1899 there was received at the docks on Lake Erie, according to the Iron Trade Review, of Cleveland, 15,222,187 long tons of ore, the greatest quantity delivered in any one year. The difference of 2,679,171 long tons between this amount and the total shipments from the upper lake ports, 17,901,358 long tons, represents the amount sent to Chicago, Milwaukee, and adjacent territory.

Ashtabula, Ohio, still holds first position as a receiving port, although closely pressed by Cleveland, and all of the ports, with the exception of Sandusky, show increased receipts.

The following table gives the receipts of iron ore by ports from the years 1892 to 1899, inclusive:

Iron ore receipts at Lake Erie ports.

Port.	1899.	1898.	1897.	1896.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Ashtabula, Ohio.....	3,341,526	2,684,563	3,001,914	2,272,822
Cleveland, Ohio.....	3,222,582	2,645,318	2,456,704	2,313,170
Conneaut, Ohio	2,320,696	1,404,169	495,327	327,623
Erie, Pa	1,309,961	1,092,364	1,311,526	847,849
Buffalo and Tonawanda, N. Y	1,530,016	1,075,975	797,446	545,101
Fairport, Ohio	1,241,013	912,879	1,008,340	941,446
Lorain, Ohio	1,112,946	536,086	355,188	191,445
Toledo, Ohio	792,348	414,012	416,438	301,794
Sandusky, Ohio	87,499	136,200	79,792	58,667
Huron, Ohio	263,600	126,755	198,231	226,515
Total.....	15,222,187	11,028,321	10,120,906	8,026,432

Port.	1895.	1894.	1893.	1892.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Ashtabula, Ohio.....	2,474,791	1,987,722	1,845,738	2,555,416
Cleveland, Ohio.....	2,312,370	1,624,573	1,260,716	1,950,224
Conneaut, Ohio	244,967	237,905	203,207	1,130
Erie, Pa	811,989	624,438	469,299	645,230
Buffalo and Tonawanda, N. Y	719,742	395,339	308,238	^a 197,000
Fairport, Ohio	914,617	976,222	792,517	866,611
Lorain, Ohio	214,219	150,424	165,667	190,400
Toledo, Ohio	260,730	158,384	145,515	139,987
Sandusky, Ohio	12,361	23,043	4,464	49,736
Huron, Ohio	146,442	172,775	137,700	65,000
Total.....	8,112,228	6,350,825	5,333,061	6,660,734

^a Buffalo alone in 1892.

Large stocks of iron ore are carried at all the lower lake ports, but in order to obtain the rebate allowed on iron ores which are not stocked and to utilize dock room for winter storage, the major portion of the ore is handled from vessels directly to railroad cars for shipment to its destination.

Owing to the enormous demand every effort was made to send down all the ore possible before the close of lake navigation, and on December 1, 1899, the stock of ore on hand at lower lake ports reached 5,530,283 long tons, or 393,876 long tons more than on December 1, 1898, when the stock was 5,136,407 tons.

During the winter months shipments are made from the piles on receiving dock to the furnaces, and on May 1, 1900, the date of opening of lake navigation, the stocks had been reduced to 1,720,656 long tons, the smallest amount reported since 1892, the shipments during the winter being the maximum on record, viz, 3,809,627 long tons. The shipments to furnaces during the seven months from May 1, 1899, to December 1, 1899, were 11,765,158 long tons, and if to this is added the winter shipments, 3,809,627 long tons, the total amount of iron ore shipped during the year from May 1, 1899, to May 1, 1900, is found to have been 15,574,785 long tons.

The following table will show the stocks of iron ore at lower lake ports on December 1 from 1895 to 1899 inclusive, and on May 1 from 1896 to 1900 inclusive, those being the dates of the closing and opening of navigation:

Stocks of iron ore at lower lake ports.

Port.	At close of navigation, December 1.				
	1896.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Ashtabula, Ohio.	1,301,302	1,441,666	1,835,694	1,732,671	1,902,598
Cleveland, Ohio.	1,200,792	1,419,311	1,478,355	1,175,970	1,200,806
Fairport, Ohio..	605,470	773,905	825,312	719,794	692,147
Erie, Pa.	335,718	355,222	484,871	439,167	361,335
Lorain, Ohio....	224,264	231,288	317,509	324,034	337,822
Conneaut, Ohio.	292,460	275,800	360,895	288,101	468,808
Toledo, Ohio....	113,132	115,959	194,644	146,568	186,422
Huron, Ohio....	101,000	200,075	230,029	139,982	164,480
Buffalo, N. Y. ...	207,199	82,267	111,660	121,620	192,681
Sandusky, Ohio.	34,375	59,491	84,786	48,500	23,184
Total.....	4,415,712	4,954,984	5,923,755	5,136,407	5,530,283

Stocks of iron ore at lower lake ports—Continued.

Port.	At opening of navigation, May 1.				
	1896.	1897.	1898.	1899.	1900.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Ashtabula, Ohio.	636, 254	926, 865	1, 031, 441	855, 691	678, 789
Cleveland, Ohio.	506, 693	979, 705	853, 776	472, 946	386, 291
Fairport, Ohio..	346, 847	480, 984	501, 592	289, 417	282, 298
Erie, Pa	137, 826	153, 261	236, 485	95, 626	97, 894
Lorain, Ohio....	118, 820	180, 605	158, 797	168, 646	126, 212
Conneaut, Ohio.	112, 406	207, 034	69, 047	6, 115	8, 649
Toledo, Ohio....	10, 593	66, 337	71, 726	22, 915	52, 616
Huron, Ohio....	55, 173	162, 292	143, 170	82, 055	48, 412
Buffalo, N. Y...	16, 644	50, 477	53, 081	72, 757	35, 195
Sandusky, Ohio.	8, 442	48, 937	48, 800	7, 086	4, 300
Total.....	1, 949, 698	3, 256, 497	3, 167, 915	2, 073, 254	1, 720, 656

To control deliveries and freight rates on iron ore one of the large steel companies built a railroad from the receiving port at Conneaut, on Lake Erie, to Pittsburg. Mr. J. T. Odell, vice-president of the Pittsburg, Bessemer and Lake Erie Railroad, in an interesting article describing the road, states that the ore equipment consists mostly of steel cars weighing 17 tons and carrying 50 tons of iron ore. To haul these ore trains some of the heaviest locomotives in the world, weighing 217,000 pounds, are used.

The total weight of an ore train, including one locomotive and the light weight of cars, will be about 2,600 tons. He states that each ore train earned on a $3\frac{1}{2}$ mill rate per long ton mile \$5.13 per train mile during the year 1899.

At Conneaut, on Lake Erie, the terminus of this road, the ore-handling appliances are of the latest and most economical pattern. Nine ships can be docked at once, and 25,000 tons of freight can be handled in ten hours. A 6,000-ton ship can be cleared in fourteen hours, and in the same length of time the ore can be at the furnaces at Pittsburg. A new steam shovel was completed last winter, by which a train of 35 or 40 cars can be loaded with ore in two hours.

At these docks in the latter part of 1899 a new unloading machine was constructed to shorten the time necessary in unloading a vessel and be independent of labor disturbances. This machine, which weighs about 400 tons and has a height of 55 feet, consists of a foundation trestle mounted on wheels, which may be moved lengthwise along the dock, the rails bearing its forward end being on the edge of the dock.

Moving backward and forward on this foundation span at right angles to the dock is a heavy walking beam, attached to the outer end of which is the depending leg or mast carrying a clam-shell bucket to dig the ore out of the hold of the vessel. The parallel motion keeps this leg in a vertical position, and the weight of the end of the walking beam, from which the bucket is suspended, is counterbalanced by a hydraulic accumulator. To operate the bucket the walking beam is run forward until the depending leg is over the hatch of the vessel. This mast, which revolves in a complete circle and on which the operator is stationed, is lowered into the hold and turned in any direction. When fully open the clam-shell bucket has a spread of 19 feet. After the bucket has been closed by hydraulic power it is lifted from the boat and run back over the dock, where the ore is discharged directly into railroad cars, or through a hopper into small cars which carry it to stock piles at the rear of the dock. The machine takes out 10 tons of ore at a time, and its capacity is stated to range, under ordinary conditions, from 250 to 300 tons per hour. It is claimed that, although the cost of installing the unloader is large, it will reduce the labor employed 75 per cent and that but six men are necessary for the operation of each machine, three being in the hold to clean up the ore which the machine can not reach, and the other three engaged in the operation of the unloader.

The cost of operating the hoisting and conveying machinery under present conditions is stated to be 14 cents per ton for labor in the hold; the wages of engineers, cost of fuel, and other incidentals bringing the total expense of unloading to 20 cents per ton.

Other large installations of unloading appliances are in course of construction at Chicago.

IMPORTS.

The Bureau of Statistics of the United States Treasury Department has courteously supplied data as to the quantity and value of iron ores imported into the United States in the year 1899, both by countries and customs districts. The statement shows that 674,082 tons of iron ore were imported in the year ending December 31, 1899, an increase of 486,874 tons, or 260 per cent, over the total of 187,208 long tons in the year 1898. The importations in 1899 were valued at \$1,082,847, or \$1.61 per ton, as against \$1.37 in 1898.

These values do not include freight on the ore from the point of shipment or the duty of 40 cents per ton.

The termination of the war with Spain was speedily followed by resumption of large shipments of iron ores from that country and its former dependency, the island of Cuba. French Africa and Italy also resumed shipments, and Newfoundland was an important contributor to the supply of iron ore in 1899.

MINERAL RESOURCES.

The following table shows the amount and value of iron ores imported into the United States, by countries, from 1896 to 1899 inclusive:

Quantity and value of iron ores imported into the United States in 1896, 1897, 1898, and 1899.

Imported from—	1896.		1897.	
	Quantity.	Value.	Quantity.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
Cuba	380,551	\$463,570	383,820	\$454,709
Spain	121,132	230,879	66,193	167,878
French Africa.....	79,661	163,517	3,504	7,785
Italy	29,882	85,661		
Greece	33,750	34,520		
Newfoundland and Labra- dor.....	20,800	20,965	29,250	29,431
United Kingdom.....	8,528	23,155	358	4,091
Colombia.....	3,150	5,800		
Portugal.....	1,101	2,327	3,612	5,831
Other countries	4,251	6,523	3,233	9,187
Total	682,806	1,036,917	489,970	678,912

Imported from—	1898.		1899.	
	Quantity.	Value.	Quantity.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
Cuba	165,623	\$187,721	360,813	\$449,616
Spain	13,335	34,932	145,206	339,058
French Africa.....			22,233	51,746
Italy			43,363	122,786
Greece	7,200	26,581	16,765	27,556
Newfoundland and Labra- dor.....			77,970	77,970
United Kingdom.....	683	5,365	172	994
Colombia.....				
Portugal.....				
Other countries	367	929	7,560	13,121
Total	187,208	255,548	674,082	1,082,847

IRON ORES.

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The imports of iron ore by customs districts in 1896, 1897, 1898, and 1899 were as follows:

Imports of iron ore into the United States in 1896, 1897, 1898, and 1899, by customs districts.

Port.	1896.		1897.	
	Quantity.	Value.	Quantity.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
Baltimore, Md	368,761	\$577,135	292,613	\$369,483
Delaware				
Philadelphia, Pa	308,217	444,687	194,814	302,211
New York, N. Y	4,199	10,499	309	1,272
Boston, Mass	78	216	46	112
Newport News, Va				
Total Atlantic ports ..	681,255	1,032,537	487,782	673,078
Cape Vincent, N. Y				
Buffalo Creek, N. Y				
Cuyahoga, Ohio	1,033	1,911		
Champlain, N. Y			104	156
Detroit, Mich	Not given.	10	139	186
Oswegatchie, N. Y				
Vermont			21	81
Total lake ports	1,033	1,921	264	423
Paso del Norte, Tex. (total Gulf ports)	257	159	919	2,525
Saluria, Tex				
Puget Sound, Wash. (total Pacific ports)	126	350	1,000	2,826
Pittsburg, Pa. (interior port)	135	1,950	5	60
Total imports	682,806	1,036,917	489,970	678,912

MINERAL RESOURCES.

Imports of iron ore into the United States, etc.—Continued.

Port.	1898.		1899.	
	Quantity	Value.	Quantity.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
Baltimore, Md	144, 213	\$178, 905	333, 258	\$516, 888
Delaware			5, 757	7, 375
Philadelphia, Pa	42, 861	74, 226	330, 594	549, 143
New York, N. Y	119	1, 815	120	703
Boston, Mass			75	175
Newport News, Va	15	602		
Total Atlantic ports ..	187, 208	255, 548	669, 804	1, 074, 284
Cape Vincent, N. Y			195	489
Buffalo Creek, N. Y			20	52
Cuyahoga, Ohio				
Champlain, N. Y			641	1, 555
Detroit, Mich			304	168
Oswegatchie, N. Y			125	260
Vermont			1, 039	2, 045
Total lake ports			2, 324	4, 569
Paso del Norte, Tex. (total Gulf ports)				
Saluria, Tex			2	4
Puget Sound, Wash. (total Pacific ports)			1, 912	3, 746
Pittsburg, Pa. (interior port)			40	244
Total imports	187, 208	255, 548	674, 082	1, 082, 847

EXPORTS.

Of late years the United States has also exported some iron ore, the greater part of which was sent from the Lake Superior region to the Canadian blast furnaces. The amount exported during the year ending December 31, 1899, was 40,665 long tons, valued at \$76,287, as against 31,579 tons exported in 1898. The exports, by customs districts, were as follows:

Iron-ore exportations from the United States in 1899, by customs districts.

Customs district.	Quantity.	Value.
	<i>Long tons.</i>	
Niagara	17,857	\$30,000
Superior	11,389	20,012
Duluth	10,534	22,465
Paso del Norte	703	2,930
Saluria	172	823
Detroit	7	42
Huron	3	15
Total	40,665	76,287

THE AMERICAN AND FOREIGN IRON TRADES IN 1899.

By JAMES M. SWANK.

General Manager of the American Iron and Steel Association.

GENERAL REVIEW.

In the spring of 1899 the industries of this country, with scarcely an exception, had entered upon a season of extraordinary prosperity. The activity in these industries in 1898 had been intensified in the early months of 1899. The aids to complete prosperity which had been lacking in 1898, namely, higher prices for manufactured products and higher wages for labor, had now become generally effective. Everybody saw that the active demand for manufactured products and for the products of our mines and forests was certain to continue for some time to come and that it would be accompanied by a still higher range of values. After this hopeful outlook was everywhere recognized a whole year had passed until May, 1900, and there had been developed in the meantime a more pressing demand and higher prices than had been foreshadowed. The mills and factories and workshops of the country were operated to their fullest capacity, and our mining and lumber industries were never so actively employed. This great activity gave increased business to the railroads in the transportation of both manufactured products and crude materials. The abundant agricultural crops of 1899 also contributed to increase the business of the railroads, so that, with the increased tonnage from the other sources mentioned, they too were operated to their fullest capacity. The home and foreign demand for these crops was so large that previous high prices for most of them were maintained, while cotton, which had been an exception to the general advance in agricultural prices, commanded unusually high prices—higher than at any time since 1893. Because of their increased business the railroad companies were compelled in 1899 to order new cars and locomotives and to improve and extend their railroad tracks, and the farmers' prosperity, following that of 1897 and 1898, enabled them to make still more extensive purchases of manufactured articles. In all the leading industries of the country there was a material increase in wages after the spring of

1899, supplementing the increase that had then taken place. Labor, both skilled and unskilled, has never been in greater demand in this country than in 1899 and the first six months of 1900. Prosperity, in brief, was general; the prosperity of one industry helped that of another. All in all the year 1899 was the most prosperous year in our history.

BOOM IN THE AMERICAN IRON TRADE.

The industrial prosperity of this country in 1899 and during the early part of 1900 was shared in a greater degree by the iron trade than by any other leading industry, and to an extent which produced in 1899 a boom of the first magnitude—a boom of far larger proportions and of longer continuance than the celebrated iron and steel boom which began in the latter part of 1879 and came to a sudden termination in February, 1880. A moderate advance in iron and steel prices had commenced in December, 1898, following two whole years of expanding markets but of low prices. This moderate advance continued until February, 1899, when it was succeeded by a more active demand and by a sharper advance, lasting all through March, when prices virtually ceased to advance. Throughout April and the first half of May they were practically stationary, but after the middle of May, to the surprise of almost everybody, they took a fresh start, advancing by leaps and bounds until October, a period of five months, when the advance in some lines was checked. In November the boom practically ended. The prices which had been established at this time averaged an increase of over 100 per cent upon the prices which had prevailed eleven months before, in December, 1898, and in some cases they greatly exceeded an increase of 100 per cent. Within the eleven months mentioned No. 1 foundry pig iron at Philadelphia rose from \$11.75 to \$25 per ton; gray forge pig iron in the same market from \$10.25 to \$20.25; gray forge pig iron at Pittsburg from \$9.25 to \$21.75; Bessemer pig iron in the same market from \$10.45 to \$25; steel rails at mills in Pennsylvania from \$17 to \$35; steel billets at Pittsburg from \$15.25 to \$43; refined bar iron from store at Philadelphia from \$1.25 per 100 pounds to \$2.50; refined bar iron at Pittsburg from \$1 to \$2.75; steel ship plates at Philadelphia from \$1.40 to \$3.15; cut nails from store at Philadelphia from \$1.30 per keg to \$2.80; and wire nails at Chicago from \$1.35 to \$3.28.

From November, 1899, until March, 1900, there was only moderate yielding in any iron and steel prices, notwithstanding a serious reaction in the stock market and heavy failures in December, but early in March a distinct weakening in the prices of many iron and steel products was everywhere recognized, and this weakening in prices is still in progress in July, when this record ends.

The remarkable character of the demand for iron and steel in 1899 is well illustrated in the large orders for cars and locomotives and steel rails that were placed in the single month of October of that year. The cars ordered in that month from car-building companies exceeded 33,000; about 350 locomotives were ordered from locomotive builders; and the orders for steel rails exceeded 500,000 tons. These orders were all for home railroads except a few locomotives. One of the reasons for taking a hopeful view of the immediate future of our iron and steel industries is the certainty that the extraordinary demand for iron and steel for new railroad building and for new equipment for existing railroads will continue for some time without material abatement. In addition to cars and locomotives and rails many steel bridges will be needed. But prices will show great reductions.

CHARACTERISTICS OF THE BOOM OF 1899.

Foreign competition was at no time a factor in determining prices or in bringing the boom of 1899 to an end. Europe needed all the iron and steel that its manufacturers could supply, and prices for these products rose rapidly in all European markets. Tariff duties on iron and steel were lost sight of by American manufacturers. Prices of iron and steel in American markets advanced in 1899 because the demand was greater than had ever before been known, and because early in the year the impression became general and was thereafter sedulously cultivated that our capacity for the production of iron and steel and iron ore and coke was not equal to the country's wants. To the persistency with which this famine cry was repeated for at least six months of 1899 may be traced much of the excitement that prevailed in that year in our iron and steel markets, the haste to place orders for future delivery never before having been equaled. And yet, with few exceptions, there was no scarcity of iron or steel or of raw materials. The production of iron and steel and of iron ore and coal and coke was of phenomenal magnitude. All the furnaces and rolling mills and steel works and foundries that were in operation at the beginning of the year or that could be put in operation were constantly employed. Our producing capacity was greatly increased. Furnaces and other plants that had long been idle were revived, additions were made to plants already active, new iron and steel works and coke ovens were built, new coal mines were opened, and old iron-ore mines were reopened. The reaction from the four years of depression following the financial panic of 1893 was at full tide all through 1899.

Another distinguishing feature of the iron and steel boom of 1899 was the organization during the year of a large number of powerful consolidations of iron and steel and other manufacturing companies, erroneously styled trusts—continuing the movement which had its

beginning in 1898. The enormous capitalization of so many manufacturing corporations, accompanied by the expectation of large profits in these enterprises, and accompanied also by an increase in the business of the railroads, produced an active and excited demand for industrial and railroad securities, creating a boom also in the stock market, and this boom in the stock market naturally increased the excitement in the iron and steel markets. Since November, 1899, the market for industrial and railroad stocks has been less active and prices have materially declined.

REACTION FROM THE BOOM OF 1899.

As has already been stated, the prices of iron and steel began to decline in a marked degree in March, 1900, and have since continued to decline. This decline has been accompanied by a shrinkage in the demand for iron and steel in all forms. The causes of this reaction in the American iron trade are not difficult to discover. One cause is that the abnormal demand during the boom period, when orders for future delivery upon a rising market were too freely placed, could not in the nature of things be continued. Another cause is that the extraordinary demand for iron and steel greatly increased the country's productive capacity, and this led naturally to an increase of capacity beyond the country's wants and to lower prices.

The reaction in demand did not particularly affect the operations of the mills and furnaces during the first six months of the present year, as they were all or nearly all busily engaged in filling old orders or in meeting immediate orders, but it did seriously affect the prospect for active business during the last six months of the year; hence concessions in prices to book what orders could be secured and to induce the placing of further orders. When the 1st of July came some furnaces that had been operated to the full extent of their capacity for a long time had been blown out or banked, and many mills that had been running night and day since the beginning of the boom were then closed. This reduction in the activity of the furnaces and mills has been continued in July. At some furnaces wages were reduced in June, and wages at some of the mills have been reduced in July. The production of furnace coke declined in June and July, and coke prices have also declined. In other lines of trade, not connected directly with the iron trade, there has occurred a marked change in the conditions which prevailed only a few months ago; orders are falling off and prices are not being maintained. Much of the activity in these lines in the past year or two has been due to the impetus given to all business by the prosperity of the iron trade, and much of their present dullness is due to the overproduction that was bound to follow extraordinary stimulation.

The highest prices for most products of iron and steel were reached in October and November of last year. The decline that has since taken place is startling. From the bimonthly period mentioned until the close of July the decline in the price of No. 1 foundry pig iron at Philadelphia, taking the highest average price in the two months, has been from \$25 to \$17.50; in gray forge pig iron at Philadelphia, from \$20.19 to \$14; in gray forge pig iron at Pittsburg, from \$21.56 to \$15; in Bessemer pig iron at Pittsburg, from \$24.69 to \$17; and in steel billets at Pittsburg, from \$41.50 to \$19. The decline has been most marked in May, June, and July. Notwithstanding these sharp declines and the shrinkage in demand, consumption is still above that of the years immediately preceding the boom, and as a rule prices are still higher than they were before the boom commenced.

THE EUROPEAN IRON MARKETS IN 1899.

It would not have been possible to advance the prices of iron and steel in this country to the figures obtained in 1899 if there had not been in the same year an unusual advance in the prices of European iron and steel, which prevented orders from going abroad. This advance in our markets followed active iron and steel markets in Great Britain and on the Continent in 1898 and in immediately preceding years. The advance in Great Britain from January, 1899, during the year was as follows for a few representative products: No. 3 foundry pig iron at Middlesborough, from 44s. 6d. to 74s. 10d. per ton; Scotch warrants at Glasgow, from 49s. 4d. to 75s. 7d.; steel rails at Middlesborough, from £4 12s. 6d. to £7; Welsh tin plates, from 10s. 9d. to 16s. 6d. Since January, 1900, British prices have still further advanced—No. 3 pig iron at Middlesborough to 79s.; Scotch warrants at Glasgow to 77s. 6d.; steel rails at Middlesborough to £7 15s., and Welsh tin plates to 16s. 9d. In Germany No. 1 foundry pig iron in Westphalia rose from 69 marks per metric ton in January, 1899, to 93 marks in January, 1900; Thomas pig iron, from 61 marks to 86 marks; bar iron in Westphalia, from 138 marks to 215 marks; steel rails in Westphalia, from 125 marks to 155 marks. Since January last German prices have still further advanced. In France and Belgium and other Continental countries there has been a corresponding advance since the beginning of 1899. In most European countries prices of iron and steel were higher in April of the present year than in January last, owing chiefly to a great scarcity of coal and to an increase in its price, particularly in Great Britain and Germany. These conditions reached a very acute stage in the early part of the year, although they had affected iron and steel prices all through 1899. But toward the middle of 1900 prices of iron and steel in all European markets began to decline, and this decline is still in progress.

INCREASED EXPORTS AND DECREASED IMPORTS OF IRON AND STEEL.

The favorable condition of our export trade in iron and steel continued in 1899, notwithstanding our high prices. Our exports of iron and steel in that year, not including agricultural implements, aggregated in value the enormous total of \$105,689,077, against \$82,771,550 in 1898 and \$62,737,250 in 1897. Our exports in 1899 included 228,665 tons of pig iron, 76,633 tons of old and scrap iron, 271,272 tons of steel rails, 54,244 tons of structural iron and steel, 56,831 tons of plates and sheets, 25,487 tons of billets, 116,317 tons of wire, and 484 locomotives. Our exports of agricultural implements, not included above, rose from a value of \$5,302,807 in 1897 to \$9,073,384 in 1898 and \$13,594,524 in 1899. Of the pig iron we sent abroad in 1899 Great Britain took 80,988 tons, against 76,356 tons in 1898 and 91,196 tons in 1897, and of the steel we sent abroad in 1899 Great Britain took 59,375 tons, against 29,374 tons in 1898 and 25,917 tons in 1897. It will be seen from the foregoing figures that a very considerable part of the extraordinary demand for iron and steel in our country in 1899 was to fill foreign orders. This demand still continues.

Our imports of iron and steel in 1899 amounted in foreign value to \$15,800,579, against \$12,474,572 in 1898 and \$13,835,950 in 1897. Our imports in 1899 included 40,372 tons of pig iron, spiegeleisen, ferro-manganese, and ferro-silicon, and 58,915 tons of tin plates. In 1898 we imported 66,775 tons of tin plates, in 1897 we imported 83,851 tons, and in 1896 we imported 119,171 tons.

CAUSES OF THE GREAT DEMAND FOR IRON AND STEEL.

The immediate and direct causes which had been instrumental in restoring prosperity to our country in 1898 and 1899 included the large exports in recent years of our agricultural and manufactured products, the practical cessation of the shipments of gold abroad and the increase in our imports of gold, the stimulating influence of the Spanish war, the increase in the circulation of money, and the settlement of the tariff question in 1897 by the passage of the Dingley bill. To these favorable influences must now be added the passage of the currency bill which was approved March 14, 1900. But what remote causes have operated to create our own prosperity and the world-wide prosperity of the last few years? European countries have been relatively as prosperous in recent years as the United States; indeed the boom in American industries in 1899 followed active markets and rising prices in the leading European countries. And then again, why was so much iron and steel needed in Europe as well as in America? These questions are more easily asked than answered.

Undoubtedly the great increase in the last few years in the world's supply of gold and its conversion into a circulating medium must be credited with a stimulating effect upon business generally in all progressive countries. Perhaps the absence of destructive European wars for nearly thirty years is a prime cause of the world's prosperity, for this freedom has promoted the welfare of European countries which are large consumers of agricultural and manufactured products, and it has led enterprising nations to develop the resources of less favored and even benighted people. The strengthening of the protective policy in many Continental countries in the last thirty years has surely had a beneficial effect upon the industries of those countries. Their people have not only been generally employed, but they have received higher wages than formerly.

Without indulging in further speculation upon the broad question of the world's prosperity in late years, we can probably indicate with more certainty the leading causes of the increased consumption of iron and steel by other countries as well as by our own. The enlarged use of iron and steel in ship building and bridge building is one cause. The increasing use of steel in the construction of public buildings and private dwellings is another cause. The magnitude of this latter use has only recently been recognized. In the United States we have commenced to substitute steel cars for wooden cars on our railroads, and in this new use of steel we find another cause of the present activity in the iron and steel industries of our own country. We are also now making our own tin plates. We are using heavier rails for our railroads than formerly. The various uses to which electricity has been applied in late years, the water supply of cities, and all kinds of engineering enterprises have also greatly increased the demand for iron and steel in all countries. Lastly, a new era in railroad building has commenced in Russia, the United States, and some other countries, the great Siberian enterprises of Russia alone calling for immense quantities of railway material.

GENERAL STATISTICAL SUMMARY.

In 1899 the United States made 13,620,703 long tons of pig iron, 7,586,354 tons of Bessemer steel ingots, 2,947,316 tons of open-hearth steel, and 10,639,857 tons of steel of all kinds, and rolled in all 10,357,397 tons of finished iron and steel, including rails; there were also shipped in the same year 18,251,804 long tons of Lake Superior iron ore and 10,129,764 short tons of Connellsville coke. The following table gives the shipments of Lake Superior iron ore and Connellsville coke and the production of leading articles of iron and steel in 1899 as compared with 1898:

Production of leading articles of iron and steel in 1899 compared with 1898.

Articles—Long tons, except coke and nails.	1898.	1899.
Shipments of iron ore from Lake Superior ..	14, 024, 673	18, 251, 804
Shipments of Connellsville coke, in short tons.	8, 460, 112	10, 129, 764
Production of—		
Pig iron, including spiegel and ferro	11, 773, 934	13, 620, 703
Spiegeleisen and ferromanganese	213, 769	219, 768
Bessemer steel ingots and castings	6, 609, 017	7, 586, 354
Open-hearth steel ingots and castings ...	2, 230, 292	2, 947, 316
All kinds of steel	8, 932, 857	10, 639, 857
Structural shapes, not including plates..	702, 197	906, 277
Plates and sheets, except nail plate.....	1, 448, 301	1, 903, 505
All rolled iron and steel, except rails ...	6, 532, 129	8, 084, 697
Bessemer steel rails	1, 976, 702	2, 270, 585
All kinds of rails	1, 981, 241	2, 272, 700
Street rails, included above	143, 815	154, 246
Iron and steel wire rods	1, 071, 683	1, 099, 376
All rolled iron and steel, including rails.	8, 513, 370	10, 357, 397
Iron and steel cut nails, in kegs	1, 572, 221	1, 904, 340
Iron and steel wire nails, in kegs	7, 418, 475	7, 599, 522

The shipments of Lake Superior iron ore in 1899 increased 4,227,131 tons as compared with the shipments of 1898, and the shipments of Connellsville coke increased 1,669,652 tons. The production of pig iron increased 1,846,769 tons; spiegeleisen and ferromanganese, 5,999 tons; Bessemer steel ingots, 977,337 tons; open-hearth steel ingots and castings, 717,024 tons; all kinds of steel, 1,707,000 tons; structural shapes, 204,080 tons; plates and sheets, 455,204 tons; Bessemer steel rails, 293,883 tons; wire rods, 27,693 tons, and all rolled iron and steel, including rails, 1,844,027 tons. There was also an increase in the production of iron and steel cut nails in 1899 as compared with 1898 of 332,119 kegs, and in iron and steel wire nails of 181,047 kegs. The production of tin plates in 1899 is estimated to have amounted to 397,767 tons, against 326,915 tons in 1898.

The number of miles of new railroad in the United States on which track was laid in 1899, not including double tracks or sidings, was about 4,600. The new railroad constructed in 1898 is definitely reported in "Poor's Manual of Railroads" for 1899 as amounting to 3,199 miles, against 2,161 miles in 1897 and 2,068 miles in 1896. At the end of 1898 there were 186,810 miles of railroad in operation in the United States.

The "Railroad Gazette" reports that the contracting shops built 2,452 locomotives in 1899, against 1,875 in 1898, an increase of 577. The number built in 1899 was the largest ever recorded for a single year. Of the whole number of locomotives built in 1899 there were 514 built for export to foreign countries, against 554 in 1898. Re-

turns have not been obtained from the railroad shops. The following figures show the number of locomotives built by contracting shops since 1888: 1899, 2,452; 1898, 1,875; 1897, 1,251; 1896, 1,175; 1895, 1,101; 1894, 695; 1893, 2,011; 1892, 2,012; 1891, 2,165; 1890, 2,240; 1889, 1,860; 1888, 2,180.

The number of locomotives built by the Baldwin Locomotive Works in 1899 was 901, against 755 in 1898, 501 in 1897, 547 in 1896, 401 in 1895, 313 in 1894, and 772 in 1893. The number built by the Schenectady Locomotive Works in 1899 was 356, against 283 in 1898, 131 in 1897, 119 in 1896, 148 in 1895, 56 in 1894, and 219 in 1893. The number of locomotives built by the Brooks Locomotive Works in 1899 was 300, against 225 in 1898, 157 in 1897, 100 in 1896, 125 in 1895, 90 in 1894, and 197 in 1893.

The "Railroad Gazette" says that the number of freight cars built by contracting shops in 1899 was 117,982, against 99,809 in 1898 and 43,588 in 1897. The number of passenger cars built in 1899 was 1,201, against 699 in 1898 and 494 in 1897. The number of street railroad cars built in 1899 was 4,710, against 4,650 in 1898. Of the freight cars built last year 10,500 were built of steel. The whole number of cars built in 1899 was 123,893, against 105,158 in 1898. The number of cars built in 1898 was greater than in any previous year since 1890, when 103,774 cars were built. Returns have not been obtained from the railroad shops.

The foreign value of all the iron and steel and manufactures thereof which were imported into the United States in the calendar year 1899 was \$15,800,579, against \$12,474,572 in 1898 and \$13,835,950 in 1897. In the above figures are included our imports of tin plates, which amounted to 58,915 tons in 1899, valued at \$3,738,567. In 1889, only ten years ago, we imported 331,311 tons of tin plates, valued at \$21,726,707. As late as 1891 our imports of tin plates amounted in value to \$25,900,305.

The imports of pig iron, spiegeleisen, ferromanganese, and ferro-silicon in the calendar year 1899 amounted to 40,372 tons, against 25,152 tons in 1898 and 19,212 tons in 1897.

The exports of iron and steel from the United States in 1899, including all manufactures of iron and steel except agricultural implements, amounted to \$105,689,077, against \$82,771,550 in 1898 and \$62,737,250 in 1897. The exports of agricultural implements in 1899 amounted to \$13,594,524, against \$9,073,384 in 1898 and \$5,302,807 in 1897.

The imports of iron ore in 1899 amounted to 674,082 long tons, against 187,093 tons in 1898. The exports of iron ore in 1899 amounted to 40,665 long tons, against 31,579 tons in 1898. The imports of manganese ore in 1899 amounted to 188,349 tons.

The shipments of coke from the Connellsville region in 1899 amounted to 10,129,764 short tons, against 8,460,112 short tons in 1898, an increase of 1,669,652 tons. The average price of all coke shipped from the Connellsville region was \$1.55 per short ton in 1898 and \$2 in 1899.

The shipments of Pocahontas Flat Top coke in 1899 amounted to 1,317,246 short tons, against 1,276,172 tons in 1898, an increase of 41,074 tons.

The shipments of anthracite coal from the Pennsylvania mines in 1899 amounted to 47,665,204 long tons, against 41,899,751 tons in 1898, an increase of 5,765,453 tons.

The shipments of Cumberland coal from the mines of Western Maryland and West Virginia in 1899 amounted to 6,131,461 long tons, against 5,533,636 tons in 1898, an increase of 597,825 tons.

The shipments of bituminous coal in 1899 through the locks and pools of the Monongahela River amounted to 146,578,075 bushels, against 153,020,000 bushels in 1898. No record was kept of the coke shipped in 1898, but in 1899 it amounted to 31,000 bushels. A bushel of coal weighs 76 pounds; of coke, 40 pounds.

The imports of coal in 1899 amounted to 1,393,640 long tons, against 1,273,706 tons in 1898. The exports of coal in 1899 amounted to 5,752,150 long tons, against 4,503,405 tons in 1898. The exports of coke in 1899 amounted to 280,196 long tons, against 199,562 tons in 1898. The imports of coke in 1898 amounted to 44,584 long tons and in 1899 to 37,808 tons.

Statistics of the production of coal in 1899 have been compiled by Edward W. Parker, statistician of the United States Geological Survey, as follows: Anthracite coal, 53,944,647 long tons; bituminous coal, 172,608,917 tons; total production of coal in 1899, 226,553,564 long tons. For the first time the production of coal by the United States exceeded that of Great Britain in 1899, preliminary statistics of the production by Great Britain in that year claiming only 220,085,303 tons.

The number of iron and steel vessels built in the United States in the fiscal year ended June 30, 1899, not including vessels for the Navy, was 91, with a tonnage of 131,379 long tons, against 63 iron and steel vessels in the fiscal year 1898, with a tonnage of 62,266 long tons, an increase of 28 vessels and of 69,113 tons.

The production of pig iron in Great Britain in 1899 was 9,305,319 long tons, according to the British Iron Trade Association, against 8,609,719 tons in 1898; the production of Bessemer steel ingots in 1899 was 1,825,074 tons; the production of open-hearth steel ingots was 3,030,251 tons; and the total production of steel in Great Britain in 1899 was in round numbers 5,000,000 tons, which was less than one-half the production in the United States.

AVERAGE MONTHLY PRICES OF IRON AND STEEL.

In the following table we give the average monthly prices of various leading articles of iron and steel in Pennsylvania in 1897, 1898, and 1899, and in the first seven months of 1900. The prices named are per long ton of 2,240 pounds, except for bar iron, which is quoted by the pound:

Average monthly prices of iron and steel from January, 1897, to July, 1900.

Months.	Old iron T rails at Phila-del-phia.	No. 1 found-ry pig iron at Phila-del-phia.	Gray forge pig iron at Phila-del-phia.	Gray forge pig iron, lake ore, at Pitts-burg.	Besse-mer pig iron at Pitts-burg.	Steel rails at mills in Penn-sylva-nia.	Steel billets at mills at Pitts-burg.	Best refined bar iron from store at Phila-del-phia.	Best refined bar iron at Pitts-burg.
1897.									
January	\$14.00	\$12.75	\$11.06	\$9.66	\$10.77	\$25.00	\$15.90	1.40	1.22
February	13.87	12.75	11.00	9.54	10.72	20.00	15.50	1.40	1.20
March	12.60	12.60	10.65	9.41	10.57	18.00	15.62	1.40	1.20
April	11.62	12.12	10.50	8.85	9.91	18.00	14.65	1.25	1.14
May	11.50	11.87	10.25	8.70	9.52	18.00	13.96	1.25	1.04
June	11.50	11.75	10.10	8.36	9.74	18.00	14.12	1.25	.99
July	11.50	11.75	10.19	8.36	9.39	18.00	14.00	1.25	.95
August	11.55	11.75	10.05	8.29	9.54	18.00	14.29	1.25	.99
September	12.25	11.87	10.50	8.55	10.04	18.00	15.50	1.25	1.07
October	13.69	12.00	10.50	9.75	10.70	18.00	16.55	1.35	1.15
November	13.15	12.00	10.50	9.56	10.52	18.00	15.87	1.35	1.15
December	12.67	12.00	10.50	9.00	10.09	18.00	15.00	1.35	1.15
1898.									
January	12.50	12.00	10.37	9.00	10.00	18.00	15.00	1.40	1.15
February	12.50	11.87	10.25	8.97	10.06	18.00	15.12	1.35	1.15
March	12.50	11.75	10.25	9.06	10.37	18.00	15.37	1.35	1.05
April	12.44	11.75	10.25	9.22	10.35	18.00	15.30	1.25	1.05
May	12.00	11.65	10.25	9.12	10.41	18.00	14.94	1.25	1.05
June	12.00	11.44	10.25	9.14	10.42	17.50	14.75	1.25	1.05
July	12.00	11.25	10.25	9.11	10.31	17.00	14.75	1.25	1.05
August	12.05	11.30	10.25	9.19	10.35	17.50	15.62	1.25	1.05
September	12.50	11.50	10.19	9.36	10.45	17.50	16.00	1.25	1.08
October	12.50	11.70	10.00	9.33	10.40	17.50	15.80	1.25	1.10
November	12.70	11.75	10.00	9.24	10.22	17.00	15.12	1.25	1.04
December	12.94	11.97	10.41	9.46	10.64	17.50	15.90	1.25	1.00
1899.									
January	13.30	12.12	10.75	9.89	11.00	18.50	17.06	1.50	1.12
February	14.16	13.25	11.69	10.87	11.69	20.25	18.87	1.45	1.22
March	16.87	16.00	14.37	13.29	14.77	24.80	24.25	1.70	1.38
April	17.87	16.50	15.00	14.50	15.06	25.75	25.25	1.75	1.65
May	18.00	16.60	15.30	15.07	16.32	25.20	27.56	1.90	1.75
June	18.75	18.62	16.60	15.94	18.70	27.25	31.87	2.00	1.88
July	20.00	20.37	17.81	17.50	20.45	28.25	33.80	2.30	2.00
August	21.30	21.70	18.10	18.37	22.37	31.00	36.37	2.40	2.28
September	23.12	23.50	19.50	20.90	23.85	32.50	41.50	2.50	2.50
October	26.20	23.70	19.65	21.19	24.50	34.00	41.50	2.50	2.60
November	27.50	25.00	20.19	21.56	24.69	35.00	39.00	2.50	2.56
December	27.25	25.00	20.31	21.52	25.00	35.00	36.37	2.50	2.50
1900.									
January	26.20	25.00	20.35	21.00	24.97	35.00	34.50	2.50	2.50
February	26.00	24.50	20.19	21.25	25.00	34.20	33.10	2.35	2.50
March	25.25	23.62	19.19	20.90	24.90	35.00	33.00	2.35	2.50
April	24.00	23.19	18.50	20.50	24.90	35.00	32.00	2.25	2.45
May	21.40	22.60	17.80	19.12	24.90	35.00	28.90	2.12	2.34
June	17.00	20.00	16.50	17.80	21.16	35.00	27.25	1.90	2.20
July	15.25	17.75	14.19	15.87	17.00	25.00	21.00	1.80	2.00

AVERAGE YEARLY PRICES OF IRON AND STEEL.

The following table gives the average yearly prices of leading articles of iron and steel in Pennsylvania for the years 1895, 1896, 1897, 1898, and 1899. These prices are obtained by averaging monthly quotations, and these have in turn been averaged from weekly quotations. The prices given are per ton of 2,240 pounds, except for bar iron, which is quoted by the 100 pounds.

Average yearly prices of iron and steel from 1895 to 1899.

Articles.	1895.	1896.	1897.	1898.	1899.
Old iron T rails at Philadelphia	\$14.09	\$14.16	\$12.49	\$12.39	\$20.36
No. 1 foundry pig iron at Philadelphia.....	13.10	12.95	12.10	11.66	19.36
Gray forge pig iron at Philadelphia.....	11.49	11.09	10.48	10.23	16.60
Gray forge pig iron at Pittsburg.....	10.94	10.39	9.03	9.18	16.72
Bessemer pig iron at Pittsburg	12.72	12.14	10.13	10.33	19.03
Steel rails at mills in Pennsylvania	24.33	23.00	18.75	17.62	28.12
Steel billets at mills at Pittsburg	18.48	18.83	15.08	15.31	31.12
Best bar iron from store at Philadelphia.....	1.44	1.40	1.31	1.28	2.07
Best bar iron at Pittsburg	1.25	1.21	1.10	1.07	1.95

PRICES OF LAKE SUPERIOR IRON ORE.

Below are given the prices at which Lake Superior iron ore has been sold upon season contracts in 1898 and 1899, per long ton, delivered at lower ports on Lake Erie; also the prices at which sales were made in December, 1899, and early in 1900 for season delivery. These prices have been furnished to the author by Mr. A. I. Findley, editor of the Iron Trade Review, of Cleveland.

Prices of Lake Superior iron ore in 1898, 1899, and 1900, by grades.

Grades.	1898.	1899.	1900.
Mesabi Bessemer	\$2.15 @ \$2.25	\$2.25 @ \$2.40	\$4.40 @ \$4.90
Mesabi non-Bessemer	1.70 @ 1.85	1.90 @ 2.10	4.00 @ 4.25
Marquette specular No. 1 Bessemer.....	3.10 @ 3.35	3.21 @ 3.50	5.93 @ 6.48
Marquette specular No. 1 non-Bessemer.	2.35 @ 2.45	2.50	5.00
Chapin	2.56	2.73½	4.96
Soft hematites, No. 1 non-Bessemer	1.90 @ 2.00	2.00 @ 2.15	4.15 @ 4.25
Gogebic, Marquette, and Menominee } No. 1 Bessemer hematites	2.75 @ 2.95	2.80 @ 3.25	5.50 @ 5.75
Vermilion No. 1 hard non-Bessemer	2.50	2.65	5.10
Chandler No. 1 Bessemer.....	3.13	3.35	6.00
Marquette extra low-phos. Bessemer....	3.65	3.85 @ 3.90	6.80 @ 6.90

The base price for 1900 of "old range" Bessemer ores, those from the Marquette, Menominee, Gogebic, and Vermilion ranges, have been fixed at \$5.50, against \$2.95 in 1899. The base adopted, says Mr. Findley, is a supposititious ore containing 63 per cent of iron,

0.045 per cent of phosphorus, and 10 per cent of moisture. The ore most closely approaching this analysis is the Norrie ore, of the Gogebic range, hence it is often spoken of as the base ore. The base price for 1900 for "old range" non-Bessemer ores with 62 per cent of iron and 12 per cent of moisture is \$4.15.

SHIPMENTS OF LAKE SUPERIOR IRON ORE.

The Iron Trade Review, of Cleveland, gives complete and detailed statistics of the shipments of iron ore from the Lake Superior region in 1897, 1898, and 1899, from which we take the following summary statement of shipments by ranges and by ports, with all-rail shipments added. The all-rail shipments for 1899 were less than for 1898. The figures include shipments to local furnaces.

Shipments of Lake Superior iron ore in 1897, 1898, and 1899, by ranges.

Range.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Marquette Range, Michigan	2,715,035	3,125,039	3,757,010
Menominee Range, Michigan and Wisconsin	1,937,013	2,522,265	3,301,052
Gogebic Range, Michigan and Wisconsin	2,258,236	2,498,461	2,796,856
Vermillion Range, Minnesota	1,278,481	1,265,142	1,771,502
Mesabi Range, Minnesota	4,280,873	4,613,766	6,626,384
Total	12,469,638	14,024,673	18,251,804

Shipments of Lake Superior iron ore in 1897, 1898, and 1899, by ports.

Port.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Escanaba	2,302,121	2,803,513	3,720,218
Marquette	1,945,519	2,245,965	2,733,596
Ashland	2,067,637	2,391,088	2,703,447
Two Harbors	2,651,465	2,693,245	3,973,733
Gladstone	341,014	335,956	381,457
Superior	531,825	550,403	878,942
Duluth	2,376,064	2,635,262	3,509,965
All rail	253,993	369,241	350,446
Total	12,469,638	14,024,673	18,251,804

RECEIPTS OF IRON ORE AT LAKE ERIE PORTS.

The Iron Trade Review annually publishes the statistics of the receipts of Lake Superior iron ore at Cleveland and other ports on Lake Erie, the ports of Buffalo and Erie included, the principal receipts being at Ashtabula and Cleveland; also the quantity left on the docks at the close of navigation. From these statistics we compile

the following summary of the receipts at all Lake Erie ports from 1886 to 1899 and of the stocks on dock at the close of navigation in each of these years:

Receipts of iron ore at Lake Erie ports from 1886 to 1899.

Year.	Receipts.	On dock.	Year.	Receipts.	On dock.
	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>
1886....	2,270,554	966,472	1893....	5,333,061	4,070,710
1887....	3,439,198	1,558,861	1894....	6,350,825	4,834,247
1888....	3,783,659	1,848,555	1895....	8,112,228	4,415,712
1889....	5,856,344	2,607,106	1896....	8,026,432	4,954,984
1890....	6,874,664	3,893,487	1897....	10,120,906	5,923,755
1891....	4,939,684	3,508,489	1898....	11,028,321	5,136,407
1892....	6,660,734	4,149,451	1899....	15,222,187	5,530,283

The receipts of Lake Superior iron ore at the ports of Buffalo (including Tonawanda), Erie, and Conneaut in the last seven years are given by the Iron Trade Review as follows, in long tons:

Receipts of Lake Superior iron ore from 1893 to 1899, by ports.

Port.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Buffalo	308,238	396,339	719,742	545,101	797,446	1,075,975	1,580,016
Erie	469,299	624,438	811,989	847,849	1,311,526	1,092,364	1,309,961
Conneaut....	208,207	237,905	244,967	327,623	495,327	1,404,169	2,320,696
Total ..	980,744	1,257,682	1,776,698	1,720,573	2,604,299	3,572,508	5,160,673

SHIPMENTS OF IRON ORE FROM NEW JERSEY MINES.

The shipments of iron ore from the mines in New Jersey have been as follows from 1891 to 1899, in long tons:

Shipments of iron ore from New Jersey mines since 1891.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1891.....	449,046	1894.....	277,483	1897.....	239,634
1892.....	469,236	1895.....	285,417	1898.....	269,771
1893.....	328,028	1896.....	262,070	1899.....	300,758

SHIPMENTS OF IRON ORE FROM THE CORNWALL MINES.

The following table shows the shipments of iron ore, in long tons, by the Cornwall mines, in Pennsylvania, from 1891 to 1899:

Shipments of iron ore from the Cornwall mines from 1891 to 1899.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1891.....	663,755	1894.....	371,710	1897.....	419,878
1892.....	634,714	1895.....	614,598	1898.....	584,342
1893.....	439,705	1896.....	463,059	1899.....	763,152

TOTAL PRODUCTION OF IRON ORE.

Previous to 1870 no iron ore statistics for the United States are complete. The figures for 1870 and 1880 are for the census years ending on May 31. For 1889 (also the census year) and all subsequent years they are for calendar years. The statistics since 1889 have been compiled by John Birkinbine for the United States Geological Survey.

Total production of iron ore since 1870.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1870.....	3,031,891	1892.....	16,296,666	1897.....	17,518,046
1880.....	7,120,362	1893.....	11,587,629	1898.....	19,433,716
1889.....	14,518,041	1894.....	11,879,679	1899.....	24,683,173
1890.....	16,036,043	1895.....	15,957,614		
1891.....	14,591,178	1896.....	16,005,449		

IMPORTS OF IRON ORE.

The following table, compiled by the Bureau of Statistics of the Treasury Department, gives the imports of iron ore into the United States during the calendar years 1897, 1898, and 1899.

Imports of iron ore in 1897, 1898, and 1899.

District.	1897.		1898.		1899	
	Long tons.	Value.	Long tons.	Value.	Long tons.	Value.
Baltimore	292,613	\$369,483	143,925	\$177,764	333,258	\$516,888
New York	309	1,272	139	440	120	703
Philadelphia..	194,814	302,211	42,861	74,226	330,594	549,130
Puget Sound..	1,919	5,351	.....	.....	1,912	3,746
Vermont	21	81	29	113	1,039	2,045
All other	294	514	139	700	7,159	10,335
Total.....	489,970	678,912	187,093	253,243	674,082	1,082,847

SHIPMENTS OF CUBAN IRON ORE.

The imports of Cuban iron ore into the United States from 1884 to 1899, included above, were as follows. Owing to the war with Spain the mines were in operation for a part of 1898 only.

Imports of iron ore from Cuba into United States since 1884.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1884.....	21, 798	1890.....	362, 068	1896.....	409, 883
1885.....	81, 106	1891.....	266, 377	1897.....	397, 173
1886.....	111, 710	1892.....	330, 357	1898.....	164, 077
1887.....	97, 711	1893.....	362, 685	1899.....	368, 759
1888.....	198, 048	1894.....	150, 439		
1889.....	256, 278	1895.....	386, 044		

During 1899 the Juragua Iron Company, Limited, exported to the United States 161,707 long tons of iron ore from its Cuban mines, which was an increase of 77,855 tons as compared with its exports of 83,852 tons in 1898. All the ore shipped by this company in 1899 was sent to ports in the United States, as follows: Baltimore, 40 cargoes, aggregating 130,861 tons; Philadelphia, 9 cargoes, aggregating 30,846 tons; total, 49 cargoes, aggregating 161,707 tons. The production of the Juragua mines from the beginning of operations in 1884 to the close of 1899 amounted to 3,339,844 long tons; of which 1,177 cargoes, aggregating 3,316,454 tons, were exported to the United States; 2 cargoes, aggregating 5,932 tons, were shipped to Nova Scotia; 4 cargoes, aggregating 10,131 tons, were lost at sea, and 7,327 tons remained on hand in Cuba and in transit on December 31, 1899.

The Spanish-American Iron Company exported 207,052 tons of iron ore from Daiquiri, Cuba, in 1899, as follows: To Baltimore, 28 cargoes, aggregating 106,240 tons; to Philadelphia, 24 cargoes, aggregating 95,056 tons; to Wilmington, 2 cargoes, aggregating 5,756 tons: total shipments to the United States, 207,052 tons. No foreign shipments were made by this company in 1899. It first commenced shipping iron ore from its Cuban mines in 1895, 74,992 long tons having been sent to the United States in that year. In 1896 the shipments to the United States amounted to 111,584 tons, in 1897 to 152,356 tons, and in 1898 to 80,225 tons. The same company shipped 51,537 tons of ore to foreign countries in 1897, but in 1898 no foreign shipments were made. Its total shipments to the close of 1899 amounted to 677,746 tons.

No iron ore has been shipped from the Cuban mines of the Sigua Iron Company for several years. This company exported to the

United States 14,022 tons in 1893 and 7,830 tons in 1892, when its first shipments were made. Shipments ceased in 1893.

The Cuban Steel Ore Company has been recently organized in Philadelphia to mine iron ore in Cuba. Its mines are situated about 50 miles west of Santiago. The company is at present pushing the work of development and the building of railroad and other connections with shipping facilities. It is expected that shipments of ore will begin before the close of the present year.

The Cuban Mining Company has been prospecting for a year or two on the north coast of Cuba and has located and purchased 10 or 12 copper properties and several iron-ore properties. Among the iron mines is one that is represented to be a mountain of hematite ore, running from 65 per cent to 68 per cent in iron, and below the Bessemer limit in phosphorus, with but a trace of sulphur. This mine, however, is about 20 miles from railroad connections.

CONSUMPTION OF IRON ORE.

We estimate our total consumption of iron ore in 1899 at 25,200,000 long tons, against 21,193,000 tons in 1898, 17,375,000 tons in 1897, 15,525,000 tons in 1896, 17,253,000 tons in 1895, 12,235,000 tons in 1894, 13,480,000 tons in 1893, 17,400,000 tons in 1892, and 15,740,000 tons in 1891. Our imports of iron ore in 1899 amounted to 674,082 long tons. This quantity subtracted from the quantity consumed leaves 24,525,918 tons as the probable consumption of domestic iron ore in 1899, against 21,005,907 tons in 1898 and 16,885,030 tons in 1897. Our small exports of iron ore are not considered in the above estimates.

PRODUCTION OF MANGANESE ORE.

The following table, for which we are indebted to the Annual Report of the United States Geological Survey for 1899-1900, gives the production of strictly manganese ore in the United States in the calendar years from 1880 to 1899, the statistics having been compiled for the Survey by the late Joseph D. Weeks for the years prior to 1896, and for subsequent years by John Birkinbine.

Production of manganese ore since 1880.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1880....	5, 761	1885.....	23, 258	1890.....	25, 684	1895.....	9, 547
1881....	4, 895	1886.....	30, 193	1891.....	23, 416	1896.....	10, 088
1882....	4, 532	1887.....	34, 524	1892.....	13, 613	1897.....	11, 108
1883....	6, 155	1888.....	29, 198	1893.....	7, 718	1898.....	15, 957
1884....	10, 180	1889.....	24, 197	1894.....	6, 308	1899.....	9, 935

IMPORTS OF MANGANESE ORE.

The following table, for which we are indebted to the Bureau of Statistics of the Treasury Department, gives the imports of manganese ore into the United States from 1889 to 1899:

Imports of manganese ore from 1889 to 1899.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1889.....	4, 286	1893.....	68, 113	1897.....	119, 961
1890.....	34, 154	1894.....	44, 655	1898.....	114, 885
1891.....	28, 825	1895.....	86, 111	1899.....	188, 349
1892.....	58, 572	1896.....	31, 489		

The Ponupo Mining and Transportation Company owns the manganese mines at Ponupo, in the province of Santiago de Cuba, in Cuba, and a controlling interest in the Sabanillo and Moroto Railroad, running from Santiago to Ponupo. During 1899 there were mined at Ponupo and shipped to the United States about 18,000 tons of rich manganese ore. In March, 1900, about 2,000 tons were being mined and shipped monthly.

IRON AND STEEL IMPORTS AND EXPORTS SINCE 1871.

The following table, which we have compiled from the reports of the Bureau of Statistics of the Treasury Department, shows the foreign value of the imports of iron and steel and manufactures of iron and steel into the United States in the calendar years from 1871 to 1899; also the value of the exports of iron and steel and manufactures thereof, not including agricultural implements, from the United States for the same years:

Imports and exports of iron and steel since 1871.

Calendar year.	Imports—value.	Exports—value.	Calendar year.	Imports—value.	Exports—value.
1871..	\$57, 866, 299	\$14, 185, 359	1886..	\$41, 630, 779	\$14, 865, 087
1872..	75, 617, 677	12, 595, 539	1887..	56, 420, 607	16, 235, 922
1873..	60, 005, 538	14, 173, 772	1888..	42, 311, 689	19, 578, 489
1874..	37, 652, 192	17, 312, 239	1889..	42, 027, 742	23, 712, 814
1875..	27, 363, 101	17, 976, 833	1890..	44, 540, 413	27, 000, 134
1876..	20, 016, 603	13, 641, 724	1891..	41, 983, 626	30, 736, 507
1877..	19, 874, 399	18, 549, 922	1892..	33, 882, 447	27, 900, 862
1878..	18, 013, 010	15, 101, 899	1893..	29, 656, 539	30, 159, 363
1879..	33, 331, 569	14, 223, 646	1894..	20, 843, 576	29, 943, 729
1880..	80, 443, 362	15, 156, 703	1895..	25, 772, 136	35, 071, 563
1881..	61, 555, 077	18, 216, 121	1896..	19, 462, 561	48, 670, 218
1882..	67, 075, 125	22, 348, 834	1897..	13, 835, 950	62, 737, 250
1883..	47, 506, 306	22, 716, 040	1898..	12, 474, 572	82, 771, 550
1884..	37, 078, 122	19, 290, 895	1899..	15, 800, 579	105, 689, 077
1885..	31, 144, 552	16, 622, 511			

EXPORTS OF IRON AND STEEL.

We are indebted to the Bureau of Statistics of the Treasury Department for the quantities and values of our exports of iron and steel in the calendar years 1898 and 1899, as follows. These statistics are given by the Bureau with more than usual fullness.

Exports of iron and steel in 1898 and 1899.

Article.	1898.		1899.	
	Quantity.	Value.	Quantity.	Value.
Pig iron, ferromanganese.....long tons..	3,700	\$155,299	13	\$816
Pig iron, all other.....do.....	249,357	2,547,252	228,665	3,281,825
Scrap and old.....do.....	73,845	771,590	76,638	952,422
Bar iron.....do.....	7,074	241,499	10,603	407,161
Steel bars or rods, other than wire rods.do....	24,806	676,113	30,724	1,038,336
Steel-wire rods.....do.....	18,510	390,144	16,992	524,466
Iron rails.....do.....	8,311	101,109	6,442	96,135
Steel rails.....do.....	293,592	5,838,464	271,272	6,122,382
Billets, ingots, and blooms.....do.....	28,600	544,771	25,487	533,241
Hoop, band, and scroll.....do.....	1,593	58,731	2,869	117,002
Iron sheets and plates.....do.....	4,466	204,170	6,196	356,791
Steel sheets and plates.....do.....	27,075	787,245	50,635	1,690,490
Tin plates and terne plates.....do.....	46	5,510	133	14,279
Structural iron and steel.....do.....	34,038	1,255,451	54,244	2,059,289
Wire.....do.....	74,666	3,036,818	116,317	5,526,980
Cut nails and spikes.....do.....	15,735	641,779	9,974	482,882
Wire nails and spikes.....do.....	13,714	574,909	33,517	1,667,976
All other, including tacks.....do.....	2,094	264,390	2,076	289,797
Car wheels.....number..	21,721	124,069	26,924	163,323
Castings, not elsewhere specified.....		780,830		1,348,133
Cutlery.....		172,982		252,156
Firearms.....		641,005		892,620
Locks, hinges, and other hardware.....		4,308,799		5,464,913
Saws.....		232,095		231,837
Tools, not elsewhere specified.....		2,404,327		3,246,780
Electrical machinery.....		2,523,644		3,145,838
Metal-working machinery.....		5,741,750		6,840,924
Printing presses, and parts of.....		843,688		1,037,644
Pumps and pumping machinery.....		2,300,811		3,016,645
Sewing machines.....		3,062,471		4,103,828
Shoemaking machinery.....		939,671		961,736
Fire engines.....number..	7	6,588	4	21,848
Locomotive engines.....do.....	576	5,190,782	464	4,767,850
Stationary engines.....do.....	522	352,668	872	494,939
Parts of engines and boilers.....		1,145,508		1,439,363
Typewriting machines, and parts of.....		2,077,250		2,776,363
All other machinery.....		16,413,893		19,721,191
Pipes and fittings.....		4,595,451		6,763,396
Safes.....number..	1,542	106,085	2,766	164,710
Scales and balances.....		328,940		487,113
Stoves, ranges, and parts of.....		449,007		524,324
All other manufactures.....		9,933,992		12,659,383
Total.....		82,771,550		106,689,077
Agricultural implements, additional.....		9,073,384		13,594,524
Iron ore.....long tons..	31,579	67,548	40,665	76,287

Our exports of iron and steel first exceeded our imports in value in the calendar year 1893. In 1899, six years later, the exports of iron and steel exceeded the imports by \$89,888,498.

IMPORTS OF IRON AND STEEL.

The following table, which has been compiled from statistics supplied by the Bureau of Statistics of the Treasury Department, gives the quantity and value of our imports of iron and steel and manufactures thereof in the calendar years 1898 and 1899.

Imports of iron and steel in 1898 and 1899.

Article.	1898.		1899.	
	Quantity.	Value.	Quantity.	Value.
	<i>Longtons.</i>		<i>Longtons.</i>	
Pig iron, spiegel, and ferromanganese	25,152	\$704,431	40,372	\$1,339,405
Scrap iron and scrap steel	1,783	33,330	10,925	168,045
Bar iron	19,119	844,363	19,792	942,347
Iron and steel rails	200	5,181	2,134	70,751
Hoop, band, and scroll iron or steel	3	224	663	33,392
Steel ingots, billets, blooms, slabs, etc.	10,656	1,008,360	12,601	1,287,725
Sheet, plate, and taggers iron or steel	2,270	181,021	7,043	464,297
Tin plates	66,775	3,311,658	58,915	3,738,567
Wire rods, of iron or steel	15,985	767,909	17,964	873,396
Wire and wire rope, of iron or steel	2,016	318,553	2,363	400,932
Anvils	309	43,166	240	32,842
Chains	117	15,967	188	26,564
Cutlery		1,059,536		1,408,811
Files, file blanks, rasps, and floats		40,492		47,624
Firearms		611,862		798,742
Machinery		1,930,436		2,185,566
Needles		409,427		366,412
All other		1,188,656		1,615,141
Total	144,385	12,474,572	173,200	15,800,579

Of the pig iron imported in 1898 and immediately preceding years much the larger part was spiegeleisen and ferromanganese, which pay duty as pig iron, but in 1899 the imports of these two articles and of ferrosilicon only slightly exceeded one-half of the total imports of pig iron. No cotton ties were imported in 1898 or 1899, and only 105 tons were imported in 1897.

EXPORTS OF AGRICULTURAL IMPLEMENTS.

The exports of agricultural implements in 1899 amounted to \$13,594,524, against \$9,073,384 in 1898 and \$5,302,807 in 1897. Mowers and reapers formed more than two-thirds of the total value of the agricultural implements exported in 1898 and 1899, the exports of

mowers and reapers in 1899 amounting to \$9,739,129. During the same year the value of the plows exported amounted to \$1,779,806 and of other agricultural implements to \$2,075,589.

PRODUCTION OF PIG IRON.

Twenty-one States made pig iron in 1899, against 19 in 1897 and 1898. In 1899 Minnesota and North Carolina again entered the list of pig-iron producing States. North Carolina has two furnaces, one of which, at Greensboro, was blown in for the first time in the first half of 1899. This furnace has since been supplied in part with iron ore from the mines near Blacksburg, South Carolina, which may be noted as probably the first step in the revival of the long-abandoned iron industry of that State. Since the opening of the new year the other furnace, at Cranberry, North Carolina, has also been blown in, making two furnaces active in that State in the spring of 1900. Minnesota has but one furnace.

The total production of pig iron in 1899 was 13,620,703 long tons, against 11,773,934 tons in 1898, an increase of 1,846,769 tons, or nearly 16 per cent. Large as was the increase in production in 1899 as compared with the production in 1898 this increase was considerably exceeded in two late years. In 1898 we made 2,121,254 tons more than in 1897, and in 1895 we made 2,788,920 tons more than in 1894. The following table gives the total production of pig iron in the last twenty-eight years:

Total production of pig iron in United States since 1872.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1872....	2,548,713	1879....	2,741,853	1886....	5,683,329	1893....	7,124,502
1873....	2,560,963	1880....	3,835,191	1887....	6,417,148	1894....	6,657,388
1874....	2,401,262	1881....	4,144,254	1888....	6,489,738	1895....	9,446,308
1875....	2,023,733	1882....	4,623,323	1889....	7,603,642	1896....	8,623,127
1876....	1,868,961	1883....	4,595,510	1890....	9,202,703	1897....	9,652,680
1877....	2,066,594	1884....	4,097,868	1891....	8,279,870	1898....	11,773,934
1878....	2,301,215	1885....	4,044,526	1892....	9,157,000	1899....	13,620,703

The great decline in the production of pig iron in 1893 and 1894 was caused by the financial panic of 1893 and the subsequent serious depression in all branches of business. The decline in 1884 and 1885 and again in 1891, although not so serious as in 1893 and 1894, was also largely due to financial panics—in the former period beginning with bank failures in New York in May, 1884, and in the latter period following the Baring failure in London in November, 1890.

The following table gives the production of pig iron by States in 1898 and 1899, in the order of their prominence in 1899:

Production of pig iron in the United States in 1898 and 1899, by States.

State.	1898.	1899.	State.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>
Pennsylvania	5,537,832	6,558,876	Michigan	147,640	134,443
Ohio	1,986,358	2,378,212	Missouri and	49,788	138,880
Illinois	1,365,898	1,442,012	Colorado	91,222	
Alabama	1,033,676	1,083,905	New Jersey	100,681	127,598
Virginia	283,274	365,491	Kentucky	100,724	119,019
Tennessee	263,439	346,166	North Carolina	13,762	17,835
New York	228,011	264,346	and Georgia		
Maryland	190,974	234,477	Connecticut	6,336	10,129
Wisconsin and	172,781	203,175	Texas	5,178	5,803
Minnesota			Massachusetts	3,661	2,476
West Virginia	192,699	187,858	Total	11,773,984	13,620,703

All the above-named States increased their production of pig iron in 1899 over 1898 except Massachusetts, West Virginia, Georgia, Michigan, and Missouri. In Pennsylvania the increase was over a million tons, or more than 55 per cent of the total increase.

Pennsylvania made nearly 49 per cent of the total production of pig iron in 1899; Ohio over 17 per cent; Illinois over 10 per cent; and Alabama almost 8 per cent. None of the other States made 3 per cent.

The production of pig iron in Pennsylvania by districts in 1899 was as follows: Lehigh Valley, 427,649 tons; Schuylkill Valley, 422,347 tons; Upper Susquehanna Valley, 163,234 tons; Lower Susquehanna Valley, 560,720 tons; Juniata Valley, 112,077 tons; Shenango Valley, 937,215 tons; Allegheny County, 3,255,678 tons; Western Pennsylvania, except Allegheny County and the Shenango Valley, 676,227 tons; charcoal (whole State,) 3,731 tons; total, 6,558,878 tons.

Allegheny County produced more than one-half of the pig iron made in Pennsylvania in 1897 and 1898 and more than one-fourth of the country's production in each year, but in 1899 it lost both of these prominent positions, making slightly less than one-half the production of Pennsylvania in that year and considerably less than one-fourth the country's production. In 1898 it increased its production 359,808 tons over 1897, and in 1897 it increased its production 601,824 tons over 1896, but in 1899 it increased its production only 232,777 tons over 1898.

The Shenango Valley increased its production 167,538 tons in 1899 over 1898; Western Pennsylvania, outside of Allegheny County and the Shenango Valley, 153,164 tons; the Lehigh Valley, 159,381 tons; the Schuylkill Valley, 119,926 tons; the Upper Susquehanna Valley,

66,568 tons; the Lower Susquehanna Valley, 65,879 tons; the Juniata Valley, 55,273 tons; charcoal, 540 tons.

The production of pig iron in Ohio in 1899 by districts was as follows: Mahoning Valley, including the Leetonia furnaces, 932,165 tons; Hocking Valley, 26,297 tons; Lake counties, 464,696 tons; miscellaneous bituminous, 724,436 tons; Hanging Rock bituminous, 224,142 tons; Hanging Rock charcoal, 6,476 tons; total, 2,378,212 tons.

The increase in the Mahoning Valley in 1899 over 1898 was 162,831 tons; in the Lake counties, 75,820 tons; in the miscellaneous bituminous district, 50,637 tons; in the Hanging Rock bituminous district, 78,909 tons; in the Hanging Rock charcoal district, 125 tons; in the Hocking Valley, 23,532 tons.

The production of pig iron in the Mahoning Valley in Ohio and in the Shenango Valley in Pennsylvania in 1898 was almost exactly the same, the former producing 769,334 tons and the latter 769,677 tons. In 1899 the Mahoning Valley, including the Leetonia furnaces, made 932,165 tons and the Shenango Valley made 937,215 tons. It was a close race in these valleys in both years, with the Shenango Valley slightly ahead.

Before passing to further details the following summary may here be given: The production of Bessemer pig iron in 1899, including a small quantity made with charcoal, was 8,202,778 tons, against 7,337,384 tons in 1898. The production of basic pig iron in 1899, all made with coke or mixed anthracite coal and coke, was 985,033 tons, against 785,444 tons in 1898. The production of spiegeleisen and ferromanganese in 1899 was 219,768 tons, against 213,769 tons in 1898. The production of charcoal pig iron in 1899 was 284,766 tons, against 296,750 tons in 1898.

PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

The production of pig iron in 1899, classified according to the fuel used, was as follows, compared with the four preceding years:

Production of pig iron according to fuel used from 1895 to 1899.

Fuel used.	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Bituminous, chiefly coke	7,950,068	7,166,471	8,464,692	10,278,911	11,736,385
Anthracite and coke	1,214,297	1,034,745	911,628	1,180,999	1,558,521
Anthracite alone	56,602	111,667	21,149	22,274	41,081
Charcoal	225,341	310,244	255,211	296,750	284,766
Total	9,446,308	8,623,127	9,652,680	11,778,934	13,620,703

The steadily increasing use of coke as a blast furnace fuel is again emphasized in the above table, as is also the steadily decreasing use of unmixed anthracite.

PRODUCTION OF BESSEMER PIG IRON.

The following table gives the production of Bessemer pig iron by States in each year from 1894 to 1899:

Production of Bessemer pig iron from 1894 to 1899, by States.

State.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Pennsylvania.....	2,494,098	3,430,880	2,796,884	3,434,930	4,040,965	4,473,493
Ohio.....	589,940	1,031,735	799,061	1,027,897	1,570,535	1,852,965
Illinois.....	513,309	885,744	807,511	1,017,997	1,210,124	1,330,169
Maryland.....	2,309	10,916	74,628	151,105	186,563	210,670
West Virginia.....	80,781	141,968	105,275	132,907	192,699	187,858
Colorado.....	69,524	55,485	40,193	6,582	88,701	96,364
Missouri.....	892	25,938	3,198	5,000	30,238	
Kentucky and Tennessee.....	2,895	10,000	600			22,756
Wisconsin.....	5,207	16,979	21,957	15,699	14,620	14,519
Michigan.....		1,789	3,497	3,473	2,939	
Minnesota.....						13,984
New Jersey.....						
New York.....	19,612	11,938				
North Carolina.....		323	2,151			
Total.....	3,808,567	5,623,695	4,654,955	5,795,584	7,337,384	8,202,778

Of the total production of Bessemer pig iron in Pennsylvania in 1899 the Lehigh Valley produced 67,103 tons; the Schuylkill Valley, 80,121 tons; the Upper Susquehanna Valley, 159,553 tons; the Lower Susquehanna Valley and the Juniata Valley, 423,357 tons; Allegheny County, 2,582,071 tons; the Shenango Valley, 742,422 tons, and the remainder of the State, 418,866 tons: total, 4,473,493 tons.

In Ohio in 1899 the Mahoning Valley produced 633,563 tons of Bessemer pig iron; the Hanging Rock bituminous district, 81,966 tons; the Lake counties, 431,059 tons, and the remainder of the State, 706,377 tons: total, 1,852,965 tons. The Hocking Valley did not make any Bessemer pig iron in 1898 or 1899.

PRODUCTION OF BASIC PIG IRON.

The production of basic pig iron in 1896 was 336,403 tons; in 1897 it was 556,391 tons; in 1898 it was 785,444 tons, and in 1899 it was 985,033 tons, or almost exactly 200,000 tons more than in 1898. The production by States in these years was as follows:

Production of basic pig iron from 1896 to 1899, by States.

State.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
New England, New York, and New Jersey....	22,692	79,041	645	.....
Pennsylvania, Allegheny County.....	168,095	265,548	378,156	470,848
Pennsylvania, other counties.....	51,768	84,520	204,547	267,760
Maryland, Virginia, and Alabama.....	73,604	97,562	154,829	166,098
Ohio, Illinois, Wisconsin, and Missouri.....	20,244	29,720	47,267	80,332
Total.....	336,403	556,391	785,444	985,033

PRODUCTION OF SPIEGELEISEN AND FERROMANGANESE.

The production of spiegeleisen and ferromanganese in 1899, included in the total production of pig iron, was 219,768 tons, against 213,769 tons in 1898. The spiegeleisen and ferromanganese produced in 1899 were made in Pennsylvania, New Jersey, Maryland, Illinois, and Colorado. The production has been as follows during the last twenty-eight years, in long tons:

Production of spiegeleisen and ferromanganese from 1872 to 1899.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1872.....	4,072	1879.....	12,438	1886.....	42,841	1893.....	81,118
1873.....	3,930	1880.....	17,503	1887.....	42,498	1894.....	120,180
1874.....	4,070	1881.....	18,827	1888.....	48,901	1895.....	171,724
1875.....	6,998	1882.....	19,610	1889.....	76,628	1896.....	131,940
1876.....	5,907	1883.....	21,941	1890.....	133,180	1897.....	173,695
1877.....	7,897	1884.....	30,262	1891.....	127,766	1898.....	213,769
1878.....	9,580	1885.....	30,956	1892.....	179,131	1899.....	219,768

NUMBER OF FURNACES IN BLAST.

The whole number of furnaces which were in blast at the close of 1899 was 289, against 202 at the close of 1898, 191 at the close of 1897, 159 at the close of 1896, 242 at the close of 1895, and 185 at the close of 1894. The following table shows the number of furnaces in blast at the close of each year since 1894, classified according to the fuel used:

Number of furnaces in blast from 1894 to 1899.

Fuel used.	1894.	1895.	1896.	1897.	1898.	1899.
Bituminous coal and coke.....	127	163	105	146	152	191
Anthracite and anth. and coke...	34	56	32	29	30	68
Charcoal	24	23	22	16	20	30
Total	185	242	159	191	202	289

The number of furnaces out of blast at the close of 1899 was 125, of which a large majority will certainly never run again. At the close of 1898 there were 212 furnaces out of blast.

STOCKS OF UNSOLD PIG IRON.

Our statistics of stocks of unsold pig iron do not include pig iron sold and not removed from the furnace bank, or pig iron in the hands of creditors, or pig iron made by the owners of rolling mills or steel works for their own use, or pig iron in the hands of consumers.

The stocks of pig iron which were unsold in the hands of manufacturers or which were under their control at the close of 1899, and were not intended for their own consumption, amounted to 63,429 tons, against 291,233 tons at the close of 1898. Included in the stocks of

unsold pig iron on hand on December 31, 1899, were 20 tons in the yards of the American Pig Iron Storage Warrant Company which were yet under the control of the makers, the part in these yards not under their control amounting to 4,880 tons, which quantity, added to the 63,429 tons above mentioned, makes a total of 68,309 tons which were on the market at that date, against a similar total of 415,333 tons on December 31, 1898.

The following table gives the quantity of unsold pig iron which was in the hands of manufacturers or under their control in warrant yards and elsewhere at the close of each year since 1874. Stocks in second hands in warrant yards are not included:

Stocks of unsold pig iron on hand at the close of each year since 1874.

Year.	Long tons.	Per cent of production.	Year.	Long tons.	Per cent of production.
1874.....	710,521	29.5	1887.....	301,913	4.7
1875.....	679,382	33.5	1888.....	300,144	4.6
1876.....	613,213	33.0	1889.....	247,679	3.2
1877.....	573,528	28.0	1890.....	608,921	6.6
1878.....	513,004	22.0	1891.....	596,333	7.2
1879.....	126,495	5.0	1892.....	506,116	5.5
1880.....	407,730	11.0	1893.....	662,068	9.2
1881.....	188,300	5.0	1894.....	597,688	8.9
1882.....	383,655	8.0	1895.....	444,332	4.7
1883.....	476,607	10.0	1896.....	711,649	8.2
1884.....	529,464	13.0	1897.....	656,489	6.8
1885.....	371,886	9.0	1898.....	291,233	2.4
1886.....	225,629	4.0	1899.....	63,429	0.46

CONSUMPTION OF PIG IRON IN THE LAST FIVE YEARS.

Our consumption of pig iron in the last five years is approximately shown in the following table, the comparatively small quantity of foreign pig iron held in bonded warehouses not being considered. Warrant stocks are included in unsold stocks.

Approximate consumption of pig iron since 1895.

Pig iron.	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Domestic production	9,446,308	8,623,127	9,652,680	11,773,934	13,620,708
Imported	53,232	56,272	19,212	25,152	40,372
Stocks unsold January 1.....	661,328	506,182	847,686	874,978	415,333
Total supply.....	10,160,868	9,185,531	10,519,578	12,674,064	14,076,408
Deduct stocks December 31	506,132	847,686	874,978	415,333	68,309
Also exports.....	26,164	62,071	262,686	253,057	228,678
Approximate consumption	9,628,572	8,275,774	9,381,914	12,005,674	13,779,421

PRODUCTION OF PIG IRON FROM 1895 TO 1899, BY STATES.

In the following table will be found a statement of the production of pig iron in the United States for the last five years, by States:

Production of pig iron from 1895 to 1899, by States.

State.	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Massachusetts ..	4,710	1,873	3,284	3,661	2,476
Connecticut	5,615	10,187	8,336	6,336	10,129
New York.....	181,702	206,075	243,304	228,011	264,346
New Jersey.....	55,502	59,163	95,696	100,681	127,598
Pennsylvania ...	4,701,163	4,024,166	4,631,634	5,537,832	6,558,878
Maryland	10,916	79,472	193,702	190,974	234,477
Virginia	346,589	386,277	307,610	283,274	365,491
North Carolina..	323	2,151			
Georgia	31,034	15,593	17,092	13,762	17,835
Alabama	854,667	922,170	947,831	1,033,676	1,083,905
Texas	4,682	1,221	6,175	5,178	5,803
West Virginia...	141,968	108,569	132,907	192,699	187,858
Kentucky	63,780	70,660	35,899	100,724	119,019
Tennessee	248,129	248,338	272,130	263,439	346,166
Ohio	1,463,789	1,196,326	1,372,889	1,986,358	2,378,212
Illinois	1,006,091	925,239	1,117,239	1,365,898	1,442,012
Michigan	91,222	149,511	132,578	147,640	134,443
Wisconsin	148,400	158,484	103,909	172,781	
Minnesota					203,175
Missouri	27,518	12,548	23,883		
Colorado	58,508	45,104	6,582	141,010	138,880
Total.....	9,446,308	8,623,127	9,652,680	11,773,934	13,620,703

PRODUCTION OF PIG IRON IN THE FIRST HALF OF 1900.

The total production of pig iron in the first half of 1900 was 7,642,569 long tons, against 6,289,167 tons in the first half of 1899 and 7,331,536 tons in the second half. The increased production in the first half of 1900 over the second half of 1899 was 311,033 tons. The production in the second half of 1899 and the first half of 1900 aggregated 14,974,105 tons, or almost 15,000,000 tons. The enormous production of the first half of 1900 will not be continued in the second half, as demand has slackened. A check in production began in June, when some furnaces were banked and others were blown out.

The production of Bessemer pig iron in the first half of 1900 was 4,461,391 long tons, against 3,788,907 tons in the first half of 1899 and 4,413,871 tons in the second half.

The production of basic pig iron in the first half of 1900, all made with coke or mixed anthracite coal and coke as fuel, was 581,868 long tons, against 482,389 tons in the first half of 1899 and 502,644 tons in the second half.

The production of charcoal pig iron in the first half of 1900 was 167,146 long tons, against 128,485 tons in the first half of 1899 and 156,281 tons in the second half. In addition there were produced in the first six months of this year 25,042 tons of pig iron with mixed charcoal and coke.

The production of spiegeleisen and ferromanganese in the first half of 1900 was 148,102 long tons, against 104,496 tons in the first half of 1899 and 115,272 tons in the second half.

The whole number of furnaces in blast on June 30, 1900, was 283, against 289 on December 31, 1899. The number out of blast on June 30 was 128, against 125 on December 31, 1899.

The stocks of pig iron which were unsold in the hands of manufacturers or their agents on June 30, 1900, amounted to 338,053 tons, against 63,429 tons on December 31, 1899. Included in the stocks of unsold pig iron on June 30 were 946 tons in the yards of the American Pig Iron Storage Warrant Company which were yet under the control of the makers, the part in these yards not under their control amounting to 4,854 tons, which quantity, added to the 338,053 tons above mentioned, makes a total of 342,907 tons which were on the market at that date, against a similar total of 68,309 tons on December 31, 1899.

LIMESTONE CONSUMED IN MAKING PIG IRON.

The limestone consumed for fluxing purposes by the blast furnaces of the United States in the production of 13,620,703 tons of pig iron in 1899 amounted to 6,707,435 tons. The average consumption of limestone per ton of pig iron produced in 1899 was about half a ton. The Muirkirk furnace at Muirkirk, Maryland, which blew in late in 1899, uses oyster shells only as a flux.

PRODUCTION OF BESSEMER STEEL.

The production of Bessemer steel ingots in the United States in 1899, counting a few thousand tons of direct castings as ingots, was 7,586,354 tons, against 6,609,017 tons in 1898, showing an increase in 1899 of 977,337 tons, or over 14 per cent. It need scarcely be added that the production of 1899 was very much the largest in our history. It was more than twice the production of 1894, and was almost twice the production of 1896. Of the total production there were 3,939 tons of castings, against a similar production in 1898 of 3,539 tons. There were no Clapp-Griffiths works in operation in 1899 and only one Robert-Bessemer plant was active. Four Tropenas plants were at work in that year, and all were employed in the production of steel castings.

The following table gives the production of Bessemer steel ingots in the United States in the last six years, including a small quantity of steel castings that was made each year:

Production of Bessemer steel ingots from 1894 to 1899.

Year.	Bessemer ingots.	Year.	Bessemer ingots.	Year.	Bessemer ingots.
	<i>Long tons.</i>		<i>Long tons.</i>		<i>Long tons.</i>
1894.....	3, 571, 313	1896.....	3, 919, 906	1898.....	6, 609, 017
1895.....	4, 909, 128	1897.....	5, 475, 315	1899.....	7, 586, 354

The following table gives the production of Bessemer steel ingots in the United States in the last five years, by States:

Production of Bessemer steel ingots from 1895 to 1899, by States.

State.	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Pennsylvania..	2, 978, 924	2, 292, 814	3, 060, 049	3, 402, 254	3, 968, 779
Ohio	719, 954	568, 535	1, 041, 541	1, 489, 115	1, 679, 237
Illinois	866, 531	780, 105	943, 774	1, 105, 040	1, 211, 246
Other States ..	343, 719	278, 452	429, 951	612, 608	727, 092
Total....	4, 909, 128	3, 919, 906	5, 475, 315	6, 609, 017	7, 586, 354

It will be noticed that Pennsylvania alone made more Bessemer steel in 1899 than the whole country made as late as 1896.

PRODUCTION OF OPEN-HEARTH STEEL.

The total production of open-hearth steel in the United States in 1899 was 2,947,316 long tons, against 2,230,292 tons in 1898, an increase of 717,024 tons, or over 32 per cent.

The following table gives the production of open-hearth steel ingots and direct castings, by States, during the past six years:

Production of open-hearth steel from 1894 to 1899.

State.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
New England	26, 204	36, 783	48, 055	51, 402	47, 381	57, 124
New York and New Jersey	21, 363	32, 203	32, 120	39, 521	47, 957	61, 461
Pennsylvania	659, 969	904, 352	1, 009, 608	1, 271, 751	1, 817, 521	2, 393, 811
Ohio	54, 182	75, 637	64, 691	78, 357	79, 886	117, 458
Illinois	23, 218	49, 500	101, 832	120, 609	183, 103	246, 183
Other States		38, 757	42, 394	47, 031	54, 444	71, 279
Total	784, 936	1, 137, 182	1, 298, 700	1, 608, 671	2, 230, 292	2, 947, 316

Our total production of open-hearth steel ingots and castings has more than doubled since 1896, when we made 1,298,700 tons. In 1899 our open-hearth steel production came very close to that of Great Britain, which was 3,030,251 tons.

The open-hearth steel made in 1899 was produced by 76 works in 14 States—Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Alabama, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, and Missouri.

Of the total production of open-hearth steel in 1899, 2,080,426 tons were made by the basic process and 866,890 tons by the acid process. In 1898 the production by the basic process was 1,569,412 tons and 660,880 tons by the acid process. In 1897 the production of basic steel amounted to 1,056,043 tons and of acid steel to 552,628 tons. In 1896 the production of basic steel amounted to 776,256 tons and of acid steel to 522,444 tons.

Sixteen works made basic open-hearth steel only in 1899, 42 made acid open-hearth steel only, and 18 made both acid and basic open-hearth steel. The following table gives the production separately of basic and acid open-hearth steel, by States, in 1899:

Production of basic and acid open-hearth steel in 1899.

State.	Basic open-hearth steel.	Acid open-hearth steel.	Total.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
New England.....	16, 171	40, 953	57, 124
New York and New Jersey	26, 439	35, 022	61, 461
Pennsylvania	1, 716, 017	677, 794	2, 393, 811
Ohio	64, 462	52, 996	117, 458
Illinois	213, 643	32, 540	246, 183
Other States	43, 694	27, 585	71, 279
Total	2, 080, 426	866, 890	2, 947, 316

The total production of direct open-hearth steel castings in 1899, included above, amounted to 169,729 long tons, of which 39,689 tons were made by the basic process and 130,040 tons were made by the acid process. In 1898 the production of open-hearth steel castings amounted to 120,587 tons, of which 28,460 tons were made by the basic process and 92,127 tons by the acid process. The total number of open-hearth steel plants which produced castings in 1899 was 41, and of this number 33 produced castings by the acid process only, 5 by the basic process only, and 3 by both processes.

The following table gives the production of open-hearth steel castings by both the acid and basic processes in 1899, by States:

Production of open-hearth steel castings in 1899.

State.	Acid castings.	Basic castings.	Total.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Massachusetts, Connecticut, New York, and New Jersey	21,640	.....	21,640
Pennsylvania	66,117	3,879	69,996
Ohio and Indiana	28,395	.....	28,395
Other States	13,888	35,810	49,698
Total	130,040	39,689	169,729

PRODUCTION OF CRUCIBLE STEEL.

The production of crucible steel in the United States in 1899 amounted to 101,213 long tons, against 89,747 tons in 1898, 69,959 tons in 1897, 60,689 tons in 1896, 67,666 tons in 1895, 51,702 tons in 1894, and 63,613 tons in 1893. Ten States produced crucible steel in 1899, namely, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Ohio, Indiana, Illinois, and Wisconsin. The direct castings produced in 1899 by the crucible process amounted to 3,500 tons.

Of the total production in 1899, of 101,213 long tons of crucible steel, Connecticut and New York contributed 9,581 tons; New Jersey, 12,585 tons; Pennsylvania, 75,528 tons; the Western States, 1,713 tons, and the Southern States, 1,806 tons.

PRODUCTION OF MISCELLANEOUS STEEL.

The production of steel in the United States in 1899 by various minor processes amounted to 4,974 long tons, of which 3,944 tons were direct castings, against 3,801 tons in 1898, 3,012 tons in 1897, 2,394 tons in 1896, 858 tons in 1895, 4,081 tons in 1894, 2,806 tons in 1893, 4,548 tons in 1892, and 4,484 tons in 1891.

TOTAL PRODUCTION OF ALL KINDS OF STEEL.

The production of all kinds of steel in the United States in 1899 was as follows: Bessemer steel, 7,586,354 long tons; open-hearth steel, 2,947,316 tons; crucible steel, 101,213 tons; all other steel, 4,974 tons; total, 10,639,857 tons, against 8,932,857 tons in 1898, 7,156,957 tons in 1897, 5,281,689 tons in 1896, 6,114,834 tons in 1895, 4,412,032 tons in 1894, 4,019,995 tons in 1893, and 4,927,581 tons in 1892. The total for 1899 includes 181,112 tons of Bessemer, open-hearth, crucible, and miscellaneous castings.

PRODUCTION OF BESSEMER STEEL RAILS.

The total production of Bessemer steel rails in 1899 amounted to 2,270,585 long tons, against 1,976,702 tons in 1898. Of the production in 1899, Pennsylvania made 1,224,807 tons, as compared with 1,053,326 tons in 1898; Illinois and the remainder of the country made 1,045,778 tons, against 923,376 tons in 1898.

TOTAL PRODUCTION OF RAILS.

The production of all kinds of rails in the United States in 1899, including light and heavy rails, and street, electric, and mine rails, was 2,272,700 long tons, against 1,981,241 tons in 1898, an increase of 291,459 tons, or over 14 per cent. The production of 1899 was composed of 2,240,767 tons of Bessemer steel rails rolled by the producers of domestic ingots, 29,818 tons of Bessemer steel rails rolled from purchased blooms and rerolled from old steel rails, 523 tons of open-hearth steel rails, and 1,592 tons of iron rails. The rail tonnage in late years has been increased by the increased weight of standard sections.

Ten States made rails in 1899, namely, Pennsylvania, Maryland, Alabama, Tennessee, Ohio, Illinois, Wisconsin, Kansas, Colorado, and Wyoming. All made Bessemer steel rails except Alabama and Wyoming. The production of Bessemer steel rails outside of Pennsylvania, Illinois, Ohio, Maryland, Colorado, and Wisconsin was very small. The iron rails were made in Pennsylvania, Tennessee, Alabama, Ohio, Illinois, and Wyoming. The open-hearth steel rails were produced in Pennsylvania and Alabama.

Of the total production of rails in 1899 Pennsylvania made almost 54 per cent, against over 53 per cent in 1898. Illinois made almost 26 per cent in 1899, against over 27 per cent in 1898. These two States made almost 80 per cent of all the rails rolled in 1899, against almost 81 per cent in 1898.

The total production of 2,272,700 tons of rails in 1899 was divided as follows: weighing under 45 pounds to the yard, 133,836 tons; weighing 45 pounds and less than 85 pounds, 1,559,340 tons; weighing 85 pounds and over, 579,524 tons.

The following table gives in detail the quantity of rails of all kinds rolled in 1898 and 1899 that weighed under 45 pounds to the yard, the quantity that weighed 45 pounds and less than 85 pounds, and the quantity that weighed 85 pounds and over:

Weight per yard of all kinds of rails produced in 1898 and 1899.

Weight per yard.	1898.			1899.		
	Pennsyl- vania.	Other States.	Total.	Pennsyl- vania.	Other States.	Total.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Under 45 pounds	67,724	56,157	123,881	62,786	71,050	133,836
45 pounds and less than 85	671,232	732,918	1,404,150	836,183	723,157	1,559,340
85 pounds and over....	815,265	137,945	453,210	326,367	253,157	579,524
Total	1,054,221	927,020	1,981,241	1,225,336	1,047,364	2,272,700

The rails reported to us which are known to have been rolled for street and electric railways in 1899 amounted to 154,246 tons, against 143,815 tons in 1898, an increase of 10,431 tons. With the exception of a few hundred tons, all were steel rails. The following table gives the production of street rails in this country from 1892 to 1899, in long tons, as reported to us. The figures for the last few years are given with some reservation, but the errors, if any, do not materially affect the general result:

Production of rails for street and electric railways from 1892 to 1899.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1892.....	111,580	1894.....	157,457	1896.....	145,210	1898.....	143,815
1893.....	133,423	1895.....	163,109	1897.....	122,244	1899.....	154,246

The following table gives the total production of iron and steel rails in the United States from 1892 to 1899, in long tons:

Production of rails of all kinds from 1892 to 1899.

Year.	Iron.	Steel.	Total.	Year.	Iron.	Steel.	Total.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
1892.....	10,437	1,541,407	1,551,844	1896.....	4,347	1,117,663	1,122,010
1893.....	6,090	1,130,368	1,136,458	1897.....	2,872	1,645,020	1,647,892
1894.....	4,674	1,017,098	1,021,772	1898.....	3,319	1,977,922	1,981,241
1895.....	5,810	1,300,325	1,306,135	1899.....	1,592	2,271,108	2,272,700

More rails were produced in 1899 than in any other year in our history. The year of next largest production was 1887, the production in that year being 2,139,640 tons. The year of next largest production was 1898, when 1,981,241 tons were made.

PRODUCTION OF IRON AND STEEL STRUCTURAL SHAPES.

Our statistics of iron and steel structural shapes embrace the production of beams, beam girders, zee bars, tees, channels, angles, and other structural forms, but they do not include plate girders made from plates. Plates are provided for under other classifications, and under the general statistics of plates are included all plates cut to specifications. Nearly all the structural shapes and plates used for structural purposes are made of steel. The total production in 1898 and 1899, by States, was as follows:

Production of iron and steel structural shapes in 1898 and 1899.

States.	1898.	1899.	States.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>
New England, New York, and New Jersey.	27,919	29,604	Ohio.....	21,233	20,941
Pennsylvania	641,726	847,371	Colorado and California..	7,731	8,057
Kentucky and Alabama..	3,588	304	Total	702,197	906,277

The increased production of structural shapes in 1899 as compared with 1898 was 204,080 long tons, or over 29 per cent. Pennsylvania made over 93 per cent of the total production in 1899, New Jersey over 3 per cent, and Ohio over 2 per cent. No other State made 1 per cent. The total production of structural shapes in 1898 was 702,197 tons; in 1897 it was 583,790 tons; in 1896 it was 495,571 tons, and in 1895 it was 517,920 tons.

PRODUCTION OF PLATES AND SHEETS.

The production of plate and sheet iron and steel in the United States in 1899, excluding nail plate, amounted to 1,903,505 long tons, against 1,448,301 tons in 1898, 1,207,286 tons in 1897, 965,776 tons in 1896, 991,459 tons in 1895, 682,900 tons in 1894, 674,345 tons in 1893, and 751,460 tons in 1892. Skelp iron and steel are not included in our totals with plates and sheets, but are classed with other rolled products.

PRODUCTION OF WIRE RODS.

The production of iron and steel wire rods in the United States in 1899 amounted to 1,099,376 long tons, against 1,071,683 tons in 1898 and 970,736 tons in 1897, showing an increase of only 27,693 tons, or a little over 2.5 per cent in 1899 over 1898. As compared with 1897 the increase in 1899 amounted to 128,640 tons, or over 13 per cent. The production in 1899 was the largest in our history, the average production in the last three years exceeding a million tons.

Pennsylvania made the largest quantity of wire rods in 1899, with Ohio second, Illinois third, and Massachusetts fourth. Three other

States, New Jersey, Kentucky, and Indiana, also rolled wire rods in 1899—seven States in all.

We still import considerable quantities of the finer grades of iron and steel wire rods, particularly steel wire rods, our total imports of rods amounting to 17,964 long tons in the calendar year 1899 and to 15,985 tons in 1898. Our exports of steel wire rods amounted to 16,992 tons in 1899 and to 18,510 tons in 1898.

PRODUCTION OF WIRE NAILS.

The production of iron and steel wire nails in the United States in 1899 amounted to 7,599,522 kegs of 100 pounds each, as compared with 7,418,475 kegs in 1898, an increase of 181,047 kegs, or over 2 per cent. In 1897 the production amounted to 8,997,245 kegs, in 1896 to 4,719,860 kegs, in 1895 to 5,841,403 kegs, in 1894 to 5,681,801 kegs, and in 1893 to 5,095,945 kegs. The wire nails produced in 1899 were manufactured by 58 works, one less than were in operation in 1898.

The following table gives the production of wire nails, by States, in 1898 and 1899, in kegs of 100 pounds:

Production of wire nails in 1898 and 1899, by States.

States.	1898.	1899.	States.	1898.	1899.
	<i>Kegs.</i>	<i>Kegs.</i>		<i>Kegs.</i>	<i>Kegs.</i>
Massachusetts, Rhode Island, and Connecticut	126,253	176,877	Indiana and Wisconsin.....	494,378	511,228
New York and New Jersey	109,833	49,603	Illinois	1,394,981	1,755,568
Pennsylvania	3,408,504	2,919,645	Missouri, Kansas, Michigan, Wash- ington, and Cal- ifornia	168,127	69,830
Maryland and West Virginia	5,000	33,125	Total	7,418,475	7,599,522
Ohio	1,711,399	2,083,646			

PRODUCTION OF CUT NAILS.

Our statistics of the production of iron and steel cut nails and cut spikes in the United States do not embrace railroad and other spikes made from bar iron, wire nails of any size, or machine-made horseshoe nails. Cut spikes are included with cut nails.

The total production of cut nails in 1899 was 1,904,340 kegs of 100 pounds each, against 1,572,221 kegs in 1898, an increase of 332,119 kegs, or over 21 per cent. In 1886 the maximum production of 8,160,973 kegs was reached. In 1899 the production of wire nails exceeded the production of cut nails by 5,695,182 kegs. In 1897 the wire-nail production exceeded the cut-nail production by 6,890,446 kegs.

Ten States made cut nails in 1899. The following table shows the production of iron and steel cut nails by States from 1894 to 1899, in kegs of 100 pounds. The wire-nail production for the same years is added to the table.

Production of cut nails since 1894.

State.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Kegs.</i>	<i>Kegs.</i>	<i>Kegs.</i>	<i>Kegs.</i>	<i>Kegs.</i>	<i>Kegs.</i>
Pennsylvania	1,061,931	938,865	646,011	1,057,964	768,171	920,133
Ohio	490,461	347,162	264,272	411,396	392,003	386,215
West Virginia	273,822	347,022	286,210	290,203	184,942	178,006
Indiana	125,000					
Massachusetts and New Jersey	166,350	161,888	137,005	142,021	127,706	149,700
Illinois	94,462	81,773	91,145	84,000	87,399	255,286
Maryland, Virginia, and Kentucky	213,034	246,184	167,227	164,465		
Missouri, Colorado, Wyoming, and California .....	.....	7,000	24,000	6,750	12,000	15,000
Total cut nails.....	2,425,060	2,129,894	1,615,870	2,106,799	1,572,221	1,904,340
Total wire nails ...	5,681,801	5,841,403	4,719,860	8,997,245	7,418,475	7,599,522
Grand total...	8,106,861	7,971,297	6,335,730	11,104,044	8,990,696	9,503,862

TOTAL PRODUCTION OF ALL ROLLED IRON AND STEEL.

By the phrase rolled iron and steel we include all iron and steel rolled into finished forms, as follows: (1) All sizes of iron and steel rails; (2) plate and sheet iron and steel; (3) iron and steel plates for cut nails and cut spikes; (4) wire rods; (5) iron and steel structural shapes; (6) bar, bolt, hoop, skelp, rolled axles, and other miscellaneous forms. Hammered axles and other forgings are not included, nor muck and scrap bars, billets, tin plate and sheet bars, and other intermediate products.

The production of all iron and steel rolled into finished forms in the United States in 1899 was 10,357,397 long tons, against 8,513,370 tons in 1898, an increase of 1,844,027 tons, or over 21 per cent. Twenty-seven States rolled either iron or steel or both iron and steel in 1899, the same number as in 1898.

It has been impossible for many years to separate rolled iron from rolled steel, but the use of puddled iron in this country has been increasing in late years, particularly in 1899 and 1900.

PRODUCTION OF ROLLED IRON AND STEEL SINCE 1887.

The production of all kinds of iron and steel rolled into finished forms in the United States from 1887 to 1899 is given below:

Production of all kinds of rolled iron and steel from 1887 to 1899.

Year.	Iron and steel rails.	Bars, hoops, axles, skelp, and shapes.	Wire rods.	Plates and sheets, except nail plate.	Cut nails.	Total.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
1887..	2, 139, 640	2, 184, 279	-----	603, 355	308, 432	5, 235, 706
1888..	1, 403, 700	2, 034, 162	279, 769	609, 827	289, 891	4, 617, 349
1889..	1, 522, 204	2, 374, 968	363, 851	716, 496	259, 409	5, 236, 928
1890..	1, 885, 307	2, 618, 660	457, 099	809, 981	251, 828	6, 022, 875
1891..	1, 307, 176	2, 644, 941	536, 607	678, 927	223, 312	5, 390, 963
1892..	1, 551, 844	3, 033, 439	627, 829	751, 460	201, 242	6, 165, 814
1893..	1, 136, 458	2, 491, 497	537, 272	674, 345	136, 113	4, 975, 685
1894..	1, 021, 772	2, 155, 875	673, 402	682, 900	108, 262	4, 642, 211
1895..	1, 306, 135	3, 005, 765	791, 130	991, 459	95, 085	6, 189, 574
1896..	1, 122, 010	2, 731, 932	623, 966	965, 776	72, 137	5, 515, 841
1897..	1, 647, 892	3, 081, 760	970, 736	1, 207, 286	94, 054	7, 001, 728
1898..	1, 981, 241	3, 941, 957	1, 071, 683	1, 448, 301	70, 188	8, 513, 370
1899..	2, 272, 700	4, 996, 801	1, 099, 376	1, 903, 505	85, 015	10, 357, 397

PRODUCTION OF IRON BLOOMS AND BILLETS.

The blooms and billets produced in forges directly from the ore in 1899. amounted to 3,142 long tons, against 1,767 tons in 1898, 1,455 tons in 1897, 1,346 tons in 1896, 40 tons in 1895, 40 tons in 1894, 864 tons in 1893, and 2,182 tons in 1892. All the ore blooms produced in 1898 and 1899 were made by the Chateaugay Ore and Iron Company, of Plattsburg, New York.

The iron blooms produced in forges from pig and scrap iron in 1899, and which were for sale and not intended for the consumption of the makers, amounted to 9,932 long tons, against 6,345 tons in 1898, 7,159 tons in 1897, 6,494 tons in 1896, 7,185 tons in 1895, 3,221 tons in 1894, and 6,605 tons in 1893. All the pig and scrap blooms made in forges in 1895, 1896, 1897, 1898, and 1899, and for sale, were produced in Pennsylvania and Maryland.

PRODUCTION OF ALLEGHENY COUNTY, PENNSYLVANIA.

The following table gives the number of blast furnaces, rolling mills, and steel works, and the production in long tons of pig iron and crude steel and of iron and steel rails and structural shapes in Allegheny County, Pennsylvania, in 1897, 1898, and 1899.

Iron and steel statistics of Allegheny County, Pennsylvania, for 1897, 1898, and 1899.

Details.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Blast furnaces.....	a 30	a 30	a 30
Production of pig iron	2,663,093	3,022,901	3,255,678
Rolling mills and steel works.....	a 61	a 60	a 63
Production of Bessemer steel	2,061,837	2,338,087	2,606,220
Production of open-hearth steel	725,262	1,042,350	1,470,271
Production of crucible and other steel.....	42,231	52,352	58,426
Total production of steel.....	2,829,330	3,432,789	4,134,917
Production of rails	538,798	564,085	606,017
Production of structural shapes.....	367,702	451,323	585,880

a Number.

Allegheny County produced in 1899 almost 24 per cent of the total production of pig iron in the United States; over 34 per cent of the total production of Bessemer steel ingots and castings; almost 50 per cent of the total production of open-hearth steel ingots and castings; over 57 per cent of the total production of crucible steel; almost 39 per cent of the total production of all kinds of steel; over 26 per cent of the total production of Bessemer steel rails, and over 64 per cent of the total production of structural shapes.

PRODUCTION OF TIN PLATES.

The duty on tin plates and terne plates provided for in the tariff act of 1890 went into effect on July 1, 1891. From that date until the close of the fiscal year ending on June 30, 1897, the statistics of our production of tin plates and terne plates were regularly collected for the Treasury Department by Col. Ira Ayer, special agent. For the second half of 1897 and the year 1898 they were collected by the editor of the Metal Worker, of New York, and for 1899 they have been estimated by the editor of the Metal Worker and the editor of Tin and Terne, of Pittsburg, the difference between their estimates not being very great. From the data thus obtained we have compiled the following table in long tons of our production of tin plates and terne plates in the calendar years 1891 to 1899, the figures for 1891 being for the last six months only. The production of dipping plants is included in the figures given for each year.

Production of tin plates in the United States from 1891 to 1899.

Calendar year.	Long tons.	Calendar year.	Long tons.
1891 (last six months) .	999	1896.....	160,362
1892.....	18,803	1897.....	256,598
1893.....	55,182	1898.....	326,915
1894.....	74,260	1899.....	397,767
1895.....	113,666	Total	1,404,552

IMPORTS OF TIN PLATES.

The following table, compiled from official sources of information, gives the quantities and foreign values of the tin plates imported into the United States in the calendar years 1871 to 1899:

Imports of tin plates from 1871 to 1899.

Year.	Long tons.	Value.	Year.	Long tons.	Value.
1871.....	82,969	\$9,946,373	1886.....	257,822	\$17,504,976
1872.....	85,629	13,893,450	1887.....	283,836	18,699,145
1873.....	97,177	14,240,868	1888.....	298,238	19,762,961
1874.....	79,778	13,057,658	1889.....	331,311	21,726,707
1875.....	91,054	12,098,885	1890.....	329,435	23,670,158
1876.....	89,946	9,416,816	1891.....	327,882	25,900,305
1877.....	112,479	10,679,028	1892.....	268,472	17,102,487
1878.....	107,864	9,069,967	1893.....	253,155	15,559,423
1879.....	154,250	13,227,659	1894.....	215,068	12,053,167
1880.....	158,049	16,478,110	1895.....	219,545	11,482,380
1881.....	183,005	14,886,907	1896.....	119,171	6,140,161
1882.....	213,987	17,975,161	1897.....	83,851	4,366,828
1883.....	221,233	18,156,773	1898.....	66,775	3,311,658
1884.....	216,181	16,858,650	1899.....	58,915	3,738,567
1885.....	228,596	15,991,152			

IRON AND STEEL SHIPBUILDING.

In the fiscal year 1899 the United States built 91 steel vessels, against 63 iron and steel vessels in the fiscal year 1898. The gross tonnage of the vessels built in the fiscal year 1899 was 131,379 tons, against 62,266 tons in the preceding year. Vessels for the United States Navy are not included in the figures here given, which have all been furnished by the Hon. Eugene T. Chamberlain, Commissioner of Navigation of the Treasury Department. All the vessels built in the fiscal year 1899 were built of steel.

SUMMARY OF STATISTICS FOR 1898 AND 1899.

The statistics of the iron and steel trade and allied industries for 1898 and 1899 are summarized in the following table:

Summary of statistics for 1898 and 1899.

Subject.	1898.	1899.
Production of pig iron.....long tons..	11,773,934	13,620,703
Production of spiegeleisen and ferromanganese included in pig iron.....long tons..	213,769	219,768
Production of bar, hoop, skelp, etc., not including wire rods, long tons.....	3,239,760	4,090,524
Production of iron and steel structural shapes.....long tons..	702,197	906,277
Production of iron and steel wire rods.....do....	1,071,683	1,099,376
Production of plate and sheet iron and steel, except nail plate, long tons.....	1,448,301	1,903,505
Production of iron and steel cut nails and cut spikes, kegs of 100 pounds.....	1,572,221	1,904,340
Production of iron and steel wire nails....Kegs of 100 pounds..	7,418,475	7,599,522
Production of all rolled iron and steel, including cut nails and excluding rails.....long tons..	6,532,129	8,084,697
Production of all rolled iron and steel, including both cut nails and rails.....long tons..	8,513,370	10,357,397
Production of Bessemer steel rails.....do....	1,976,702	2,270,585
Production of open-hearth steel rails.....do....	1,220	523
Production of iron rails.....do....	8,319	1,692
Production of all kinds of rails.....do....	1,981,841	2,272,700
Production of street rails, included above.....do....	143,815	154,246
Production of Bessemer steel.....do....	6,609,017	7,586,854
Production of open-hearth steel.....do....	2,230,292	2,947,316
Production of crucible steel.....do....	89,747	101,213
Production of blister and patented steel.....do....	3,801	4,974
Production of all kinds of steel.....do....	8,982,857	10,639,857
Production of ore, pig, and scrap blooms for sale.....do....	8,112	13,074
Production of tin plates and terne plates.....do....	326,915	397,767
Value of imports of iron and steel.....	\$12,474,572	\$15,800,579
Value of exports of iron and steel.....	\$82,771,550	\$105,689,077
Production of iron ore.....long tons..	19,433,716	24,683,173
Imports of iron ore.....do....	187,093	674,082
Total consumption of iron ore.....do....	21,193,000	25,200,000
Production of all kinds of coal.....do....	196,405,953	226,553,564
Shipments of Pennsylvania anthracite.....do....	41,899,751	47,665,204
Imports of coal.....do....	1,273,706	1,393,640
Exports of coal.....do....	4,503,405	5,752,150
Iron and steel ships built in the year ended June 30.....	63	91
Miles of new railroad completed.....	3,199	a 4,600

a About.

**AVERAGE MONTHLY PRICES OF STEEL RAILS AT MILLS
IN PENNSYLVANIA FROM 1868 TO 1899.**

The following table of average monthly prices of steel rails has been compiled by the American Iron and Steel Association from weekly quotations and are per ton of 2,240 pounds.

Average monthly prices of steel rails at Pennsylvania mills since 1868.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average.
1868	\$165.00	\$167.50	\$174.00	\$172.00	\$165.00	\$162.50	\$150.00	\$150.00	\$150.00	\$150.00	\$148.00	\$147.50	\$158.50
1869	145.00	143.25	135.00	134.00	130.25	128.00	130.00	130.00	130.00	130.50	130.25	120.00	132.25
1870	110.00	110.00	108.50	107.00	106.00	109.25	110.00	110.00	108.75	101.50	102.50	98.00	106.75
1871	95.00	96.00	106.00	95.00	103.00	104.00	103.75	104.00	106.00	105.75	105.25	106.50	102.50
1872	104.50	104.00	104.25	111.50	110.00	113.00	114.50	115.25	114.00	113.50	118.00	120.75	112.00
1873	121.00	120.00	122.50	120.25	120.00	121.75	121.75	121.75	118.00	120.00	120.00	120.00	120.50
1874	117.50	117.50	115.00	98.67	98.33	96.25	91.00	89.25	78.25	78.25	75.67	75.67	94.25
1875	71.00	71.00	71.00	69.00	69.00	69.00	69.00	69.00	69.00	67.00	66.00	65.00	68.75
1876	67.00	65.00	62.00	62.00	62.00	60.00	59.00	59.00	56.00	54.00	53.00	52.00	59.25
1877	49.00	49.00	49.00	49.00	47.25	46.50	45.25	44.75	44.00	42.25	40.50	40.50	45.50
1878	41.00	41.50	41.50	42.00	43.50	43.00	43.50	42.50	42.50	42.50	42.00	41.00	42.25
1879	41.00	42.00	43.00	42.50	42.00	43.00	44.00	48.00	50.00	55.00	61.00	67.00	48.25
1880	75.00	85.00	82.00	75.00	65.00	63.75	62.50	63.75	61.25	60.00	59.00	58.00	67.50
1881	60.00	62.00	62.50	63.00	63.00	60.00	61.00	60.00	60.00	60.00	61.50	60.00	61.13
1882	58.00	55.00	54.00	52.75	48.75	48.25	48.00	47.00	45.00	44.25	42.00	39.00	48.50
1883	40.00	39.50	39.00	38.50	38.00	38.00	38.00	38.00	37.50	37.00	35.00	34.50	37.75
1884	34.00	34.00	34.00	34.00	33.00	32.00	30.00	28.00	27.00	28.00	28.00	27.00	30.75
1885	27.00	27.00	26.50	26.00	27.00	27.25	27.25	27.25	29.00	30.50	33.00	34.50	28.50
1886	34.50	34.50	34.50	34.50	34.50	34.50	34.50	34.25	34.00	34.00	34.50	36.00	34.50
1887	38.50	39.50	39.50	39.25	39.00	39.00	38.50	37.00	36.00	34.25	32.50	32.00	37.08
1888	31.50	31.50	31.50	31.50	31.00	30.00	30.00	29.00	28.50	28.00	27.50	28.00	29.83
1889	27.50	27.50	27.50	27.50	27.00	27.50	28.00	28.00	29.50	32.00	34.00	35.00	29.25
1890	35.25	35.00	34.00	33.50	31.35	31.50	31.50	31.25	30.50	30.00	29.00	28.50	31.75
1891	29.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	29.92
1892	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1893	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	27.50	25.00	24.00	28.12
1894	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
1895	22.00	22.00	22.00	22.00	22.00	22.00	24.00	24.00	28.00	28.00	28.00	28.00	24.33
1896	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
1897	25.00	20.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.75
1898	18.00	18.00	18.00	18.00	18.00	17.50	17.00	17.50	17.50	17.50	17.50	17.50	17.62
1899	18.50	20.25	24.00	25.75	25.20	27.25	28.25	31.00	32.50	34.00	35.00	35.00	28.12

**AVERAGE PRICES PER LONG TON OF NO. 1 FOUNDRY PIG
IRON AT PHILADELPHIA SINCE 1860.**

The following table of average monthly prices of No. 1 foundry pig iron at Philadelphia has been compiled by the American Iron and Steel Association from weekly quotations, per ton of 2,240 pounds.

Average monthly prices of No. 1 foundry pig iron at Philadelphia since 1860.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average.
1860	\$23.00	\$23.00	\$23.37	\$22.37	\$22.75	\$22.75	\$22.75	\$22.50	\$22.25	\$22.37	\$22.75	\$22.50	\$22.75
1861	22.12	21.75	21.25	21.87	21.12	20.50	19.87	18.75	18.75	18.62	18.87	19.62	20.25
1862	20.00	20.75	20.75	21.50	21.50	22.75	24.00	24.37	24.50	25.25	30.50	31.12	23.88
1863	32.00	33.25	35.50	36.00	34.75	33.50	32.75	31.75	33.00	35.75	41.12	43.50	35.25
1864	43.17	48.62	50.12	54.50	57.25	57.62	69.12	73.62	72.25	63.75	61.50	59.12	59.25
1865	58.12	53.12	50.37	45.50	39.12	35.00	35.67	40.12	44.33	49.87	51.00	50.75	46.12
1866	50.37	49.00	46.12	41.75	41.37	43.87	46.50	47.25	48.12	48.75	49.50	49.50	46.88
1867	48.75	46.50	44.75	41.00	42.75	43.00	43.33	44.00	44.50	44.50	43.75	42.12	44.12
1868	38.67	36.75	37.87	38.33	37.00	37.00	38.17	39.50	40.17	41.37	42.87	43.25	39.25
1869	42.00	40.25	41.50	40.00	39.50	40.87	41.62	41.12	40.75	40.50	39.75	39.50	40.63
1870	36.25	34.50	34.50	33.25	33.25	32.50	32.75	33.50	33.25	32.25	31.50	31.25	33.25
1871	30.50	30.87	34.25	35.37	35.50	35.00	35.75	36.00	36.50	36.67	37.25	37.25	35.12
1872	37.00	40.75	47.00	49.50	49.50	53.37	51.33	52.75	53.87	53.33	51.25	47.62	48.88
1873	45.17	48.00	48.37	47.75	46.00	45.00	43.75	43.50	42.50	38.00	33.00	32.50	42.75
1874	32.00	32.00	32.00	32.00	31.50	31.50	31.50	31.00	29.50	29.00	26.25	24.00	30.25
1875	25.67	26.50	27.00	27.00	26.00	26.00	26.00	26.00	25.00	24.00	23.75	23.50	25.50
1876	23.25	23.00	23.00	22.75	22.00	22.00	22.00	22.00	21.75	21.75	21.50	21.25	22.25
1877	20.75	20.00	20.00	19.50	19.00	18.75	18.25	18.00	18.25	18.50	18.00	18.00	18.88
1878	18.50	18.50	18.50	18.50	18.00	17.25	17.25	17.50	17.50	17.00	16.50	17.00	17.63
1879	17.25	17.50	17.87	18.00	18.50	18.75	19.25	20.75	24.25	30.00	28.00	30.60	21.50
1880	40.00	41.00	37.50	31.00	25.00	23.00	23.50	25.00	23.25	23.00	24.50	25.00	28.50
1881	25.00	25.50	26.00	25.00	25.00	24.00	24.50	24.50	25.25	25.50	25.75	26.00	25.12
1882	26.00	26.00	25.75	25.50	25.50	25.50	25.50	25.50	26.00	26.25	26.00	25.75	25.75
1883	25.00	24.50	24.00	23.50	22.00	21.00	21.50	22.00	22.00	21.50	21.00	21.00	22.38
1884	20.50	20.50	20.50	20.00	20.00	20.00	20.00	19.50	19.50	19.50	19.25	18.50	19.88
1885	18.00	18.00	18.00	18.00	17.87	17.75	17.75	17.75	18.00	18.25	18.25	18.25	18.00
1886	18.50	18.50	18.75	18.50	18.50	18.25	18.25	18.25	18.50	19.00	19.50	20.00	18.71
1887	21.50	21.50	21.00	20.75	20.85	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.92
1888	21.00	20.75	20.50	19.75	18.50	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.88
1889	18.00	18.00	18.00	17.35	17.00	17.25	17.25	17.50	17.50	17.50	18.50	19.25	17.75
1890	19.90	19.50	19.25	18.25	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.40
1891	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.75	17.50	17.50	17.52
1892	17.50	17.00	16.50	16.00	15.95	15.69	15.06	15.00	15.00	15.00	15.17	15.12	15.75
1893	14.80	14.75	14.69	14.58	14.85	15.00	15.00	14.50	14.33	14.20	13.75	13.75	14.52
1894	13.37	13.00	13.00	12.60	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.66
1895	12.08	12.00	12.06	12.00	12.06	12.50	13.80	13.75	14.20	14.50	14.44	13.85	13.10
1896	13.56	13.50	13.45	13.25	12.83	12.75	12.75	12.75	12.50	12.56	12.81	12.75	12.95
1897	12.75	12.75	12.60	12.12	11.87	11.75	11.75	11.75	11.87	12.00	12.00	12.00	12.10
1898	12.00	11.87	11.75	11.75	11.65	11.44	11.25	11.30	11.50	11.70	11.75	11.97	11.66
1899	12.12	13.25	16.00	16.50	16.60	18.62	20.37	21.70	23.50	23.70	25.00	25.00	19.36

PROGRESS OF THE CANADIAN IRON TRADE.

We are glad to record a marked improvement in the iron and steel industries of Canada in 1899. Relatively these industries made as much progress in that year as those of the United States and of European countries. New iron and steel enterprises were undertaken, chiefly in the Province of Ontario, and the production of works that had already been established was increased. Canada now bids fair to become in a few years an important contributor to the world's supply of iron and steel, and possibly it may contribute in a still larger degree to its supply of iron ore and coal.

The progress of the Canadian iron and steel industries in 1899, as in the two preceding years, has been greatly promoted by the action of the Dominion Parliament in enacting the bounty act of June 29, 1897, which provided for the payment of liberal bounties by the Dominion government to the manufacturers of "steel ingots, puddled iron bars, and pig iron," \$3 per ton to be paid "on steel ingots manufactured from ingredients of which not less than 50 per cent of the weight thereof consists of pig iron made in Canada;" \$3 per ton "on puddled iron bars manufactured from pig iron made in Canada;" \$3 per ton "on pig iron on the proportion produced from Canadian ore," and \$2 per ton "on pig iron on the proportion produced from foreign ore." By the terms of the act referred to these bounties were to terminate on April 23, 1902, but an act of the Dominion Parliament dated August 11, 1899, extended the bounty provisions to June 30, 1907, provided, however, that they should be annually reduced after April 23, 1902, as follows: from that date to June 30, 1903, 90 per cent shall be paid; from July 1, 1903, to June 30, 1904, 75 per cent; from July 1, 1904, to June 30, 1905, 55 per cent; from July 1, 1905, to June 30, 1906, 35 per cent; from July 1, 1906, to June 30, 1907, 20 per cent. The act of August 11, 1899, also provided that, "notwithstanding anything in the statutes of 1897, or in this act, no bounty shall be paid under this act on steel ingots made from puddled iron bars manufactured in Canada." The bounty provisions of the act of June 29, 1897, were held to have come into force on April 23, 1897. We have quoted from the official copy of the acts of the Dominion Parliament.

PRODUCTION OF IRON AND STEEL IN CANADA.

The production of pig iron in the Dominion of Canada was first ascertained from the manufacturers by the American Iron and Steel Association for the year 1894, when it amounted to 44,791 long tons. In 1895 the production amounted to 37,829 tons, in 1896 to 60,030 tons, in 1897 to 53,796 tons, and in 1898 to 68,755 tons. In 1899 the production of all kinds of pig iron, including spiegeleisen and ferro-

manganese, was 94,077 tons, of which 17,796 tons were charcoal and 76,281 tons were charcoal and coke mixed and coke pig iron. The production of Bessemer pig iron in 1899, included in the figures given above, was 5,120 tons, and the production of basic pig iron was 22,666 tons—all made by one company. The total production of pig iron in 1899 as compared with that of 1898 shows an increase of 25,322 tons. The consumption of limestone by the Canadian furnaces in 1899 amounted to 50,726 tons, against 30,302 tons in 1898.

Canada produced spiegeleisen and ferromanganese for the first time in the spring of 1899, the Mineral Products Company, of Hillsboro, New Brunswick, having blown in its leased furnace at Bridgeville, Nova Scotia, on May 11 of that year. A mixture of charcoal and coke was used for fuel. The furnace did not run continuously on spiegeleisen and ferro-manganese in 1899, about one-fourth of its production during the year being ordinary pig iron.

On December 31, 1899, the unsold stocks of pig iron in Canada which were in the hands of the manufacturers or their agents amounted to 9,932 tons, as compared with 9,979 tons on December 31, 1898, 20,265 tons on December 31, 1897, 29,320 tons on December 31, 1896, and 17,800 tons on December 31, 1895. Of the unsold pig iron on hand on December 31, 1899, a little less than one-half was charcoal pig iron, the remainder being coke.

On December 31, 1899, there were 9 completed blast furnaces in the Dominion, and of this number 4 were in blast and 5 were out of blast. On December 31, 1898, there were also 9 completed furnaces, of which 3 were in blast and 6 were out of blast.

The production of Bessemer and of basic and acid open-hearth steel ingots and castings in 1899 was 22,000 long tons, against 21,540 tons in 1898. Of the total production of open-hearth steel in 1899 about one-third was made by the acid process. The production of iron rails and open-hearth steel rails in 1899 amounted to 835 long tons, against 600 tons in 1898; structural shapes, 2,899 tons, against 1,565 tons in 1898; cut nails made by rolling mills and steel works having cut-nail factories connected with their plants, 235,981 kegs of 100 pounds, against 152,688 kegs in 1898; plates and sheets, 2,220 tons, against about 1,000 tons in 1898; all other rolled products, excluding muck and scrap bars, blooms, billets, sheet bars, etc., 94,153 tons, against 80,322 tons in 1898. Changing the cut nail production from kegs to long tons, the total quantity of all kinds of iron and steel rolled into finished products in the Dominion in 1899, excluding muck and scrap bars, billets, and other intermediate products, amounted to 110,642 tons, against 90,303 tons in 1898, 77,021 tons in 1897, 75,043 tons in 1896, and 66,402 tons in 1895.

The total number of completed rolling mills and steel works in Canada on December 31, 1899, was 16. Of this number at least 3 were idle during the whole of 1899.

THE WORLD'S PRODUCTION OF IRON ORE AND COAL.

The following table gives the production of iron ore and coal in all countries in 1899, or for the latest year for which complete statistics are available. Coal is the principal fuel used in the production of iron and steel, and hence deserves a place in this table. Long tons of 2,240 pounds are used in giving the production of the United States, Great Britain, Canada, Cuba, India, Natal, New South Wales and other Australasia, and "other countries," and metric tons of 2,204 pounds are used for all other countries, the latter being used as the equivalent of long tons in ascertaining the total production of all countries. As far as possible the statistics given have been obtained from official sources.

The world's production of iron ore and coal.

Countries	Iron ore.			Coal and lignite.		
	Years.	Tons.	Per cent.	Years.	Tons.	Per cent.
United States	1899	24,683,173	29.47	1899	226,553,564	31.54
Great Britain	1898	14,176,938	16.93	1899	220,085,303	30.65
Germany and Luxemburg	1899	17,989,665	21.48	1899	135,824,427	18.91
France	1898	4,731,394	5.65	1898	32,356,104	4.50
Belgium	1898	217,370	.28	1899	21,917,740	3.05
Austria-Hungary	1898	3,400,485	4.06	1898	37,786,963	5.26
Russia	1897	4,107,470	4.91	1898	12,862,033	1.79
Sweden	1898	2,302,914	2.75	1898	236,277	.03
Spain	1899	9,234,302	11.03	1899	2,742,389	.38
Italy	1898	201,260	.24	1898	341,327	.05
Canada	1899	68,891	.08	1899	4,397,367	.61
Cuba	1899	368,759	.44			
South African Republic				1898	1,938,424	.27
Natal				1898	387,811	.05
India	1897	43,314	.05	1898	4,136,813	.58
Greece	1898	485,159	.58	1898	17,310	
New South Wales	1897	234		1899	4,597,028	.64
Other Australasia				1898	1,601,968	.22
Japan	1896	27,421	.03	1897	5,647,751	.79
Algeria	1898	473,569	.56	1898	200	
Other countries (about)	1899	1,234,855	1.48	1899	4,849,380	.68
Total		83,747,173	100.00		718,280,179	100.00

THE WORLD'S PRODUCTION OF PIG IRON AND STEEL.

In the following table is given the production of pig iron and steel in all countries in 1899 or in the most recent year for which statistics have been received. English tons of 2,240 pounds are used for Great Britain, Canada, the United States, and "other countries," and metric tons of 2,204 pounds for all other countries, metric tons being used as the equivalent of English tons in ascertaining the total production for all countries. The statistics of steel production for the United States, Great Britain, France, Belgium, Austria-Hungary, Russia and Finland, Sweden, Spain, and Canada embrace ingots and direct castings, but for Germany and Luxemburg and Italy complete ingot statistics are not available and the statistics for finished steel have been used.

The world's production of pig iron and steel.

Country.	Pig iron.			Steel.		
	Years.	Tons.	Per cent.	Years.	Tons.	Per cent.
United States	1899	13,620,703	34.56	1899	10,639,857	39.25
Great Britain	1899	9,305,319	23.61	1899	5,000,000	18.44
Germany and Luxemburg	1899	8,142,017	20.66	1899	6,290,434	23.20
France	1899	2,567,388	6.51	1899	1,554,354	5.73
Belgium	1899	1,036,185	2.63	1899	729,920	2.70
Austria-Hungary	1898	1,427,240	3.62	1898	880,696	3.25
Russia and Finland	1898	2,222,469	5.64	1898	1,494,000	5.51
Sweden	1898	531,766	1.35	1898	265,121	.98
Spain	1899	295,840	.75	1899	122,954	.45
Italy	1897	8,393	.02	1898	94,667	.35
Canada	1899	94,077	.24	1899	22,000	.08
Japan	1897	57,678	.15	.....	.....	.....
Other countries (about)	1899	100,925	.26	1899	15,997	.06
Total .....	.....	39,410,000	100.00	.....	27,110,000	100.00

In tables that we have heretofore published we have given the world's probable total production of pig iron in 1800 as 825,000 long tons; in 1830 as 1,825,000 tons; in 1850 as 4,750,000 tons; in 1870 as 11,900,000 tons; in 1880 as 17,950,000 tons; in 1890 as 27,157,000 tons; and now we give the total production in 1899 as 39,410,000 tons, of which the United States made 34.56 per cent.

From the most trustworthy sources of information that were available more than twenty years ago we then estimated the world's production of steel in 1878 as amounting to 3,021,000 long tons. Subsequently we estimated the production in 1889 as amounting to 10,948,000 tons. The figures given in the above table show that the production had increased in 1899 to 27,110,000 tons, of which the United States made 39.25 per cent.

THE WORLD'S GREAT PIG IRON PRODUCERS.

For the United States and Great Britain long tons of 2,240 pounds are used in the table below, and for France, Germany and Luxemburg, and Russia metric tons of 2,204 pounds are used.

Production of pig iron, by principal countries, since 1869.

Year.	United States.	Great Britain.	a Germany.	France.	b Russia.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Metric tons.</i>	<i>Metric tons.</i>	<i>Metric tons.</i>
1869.....	1,711,287	5,445,757	1,409,429	1,380,965	-----
1870.....	1,665,179	5,963,515	1,391,124	1,178,114	359,531
1871.....	1,706,793	6,627,179	1,563,682	859,641	359,253
1872.....	2,548,713	6,741,929	1,988,395	1,217,838	399,253
1873.....	2,560,963	6,566,451	2,240,575	1,381,626	384,221
1874.....	2,401,262	5,991,408	1,906,263	1,415,897	380,219
1875.....	2,023,733	6,365,462	2,029,389	1,448,272	427,182
1876.....	1,868,961	6,555,997	1,846,345	1,435,212	441,433
1877.....	2,066,594	6,606,664	1,932,725	1,506,827	398,238
1878.....	2,301,215	6,381,051	2,147,641	1,521,274	417,239
1879.....	2,741,853	5,995,337	2,226,587	1,400,286	432,636
1880.....	3,835,191	7,749,233	2,729,038	1,725,293	448,411
1881.....	4,144,254	8,144,449	2,914,009	1,886,350	469,476
1882.....	4,623,323	8,586,680	3,380,806	2,039,067	462,530
1883.....	4,595,510	8,529,300	3,469,719	2,069,430	481,679
1884.....	4,097,868	7,811,727	3,600,612	1,871,537	509,519
1885.....	4,044,526	7,415,469	3,687,434	1,630,648	527,536
1886.....	5,683,329	7,009,754	3,528,658	1,516,574	532,104
1887.....	6,417,148	7,559,518	4,023,953	1,567,622	612,447
1888.....	6,489,738	7,998,969	4,337,121	1,683,349	683,315
1889.....	7,603,642	8,322,824	4,524,558	1,733,964	740,067
1890.....	9,202,703	7,904,214	4,658,451	1,962,196	926,482
1891.....	8,279,870	7,406,064	4,641,217	1,897,387	1,004,923
1892.....	9,157,000	6,709,255	4,937,461	2,057,258	1,071,813
1893.....	7,124,502	6,976,990	4,986,003	2,003,096	1,148,937
1894.....	6,657,388	7,427,342	5,380,038	2,069,714	1,332,506
1895.....	9,446,308	7,703,459	5,465,414	2,003,868	1,452,380
1896.....	8,623,127	8,659,681	6,372,575	2,339,537	1,612,069
1897.....	9,652,680	8,796,465	6,881,466	2,484,191	1,868,671
1898.....	11,773,934	8,609,719	7,312,766	2,525,075	2,222,469
1899.....	13,620,703	c 9,305,319	d 8,142,017	d 2,567,388	-----

a Including Luxemburg. b Includes Finland. c British Iron Trade Association. d Provisional.

Austria and Hungary annually produce over a million tons of pig iron, Belgium about a million tons, Sweden about half a million tons, and Spain about 300,000 tons. See table on the preceding page.

**PRODUCTION OF BESSEMER STEEL INGOTS AND RAILS IN
THE UNITED STATES AND GREAT BRITAIN.**

The production of Bessemer steel ingots and of Bessemer steel rails in the United States from 1867 to 1899 and in Great Britain as far back as statistics are available was as follows, in long tons.

*Production of Bessemer steel ingots and rails in the United States and Great Britain from
1867 to 1899.*

Year.	United States.		Great Britain.	
	Ingots.	Rails.	Ingots.	Rails.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
1867.....	2, 679	2, 277	.....	.....
1868.....	7, 589	6, 451	110, 000	.....
1869.....	10, 714	8, 616	160, 000	.....
1870.....	37, 500	30, 357	215, 000	.....
1871.....	40, 179	34, 152	329, 000	.....
1872.....	107, 239	83, 991	410, 000	.....
1873.....	152, 368	115, 192	496, 000	.....
1874.....	171, 369	129, 414	540, 000	.....
1875.....	335, 283	259, 699	620, 000	.....
1876.....	469, 639	368, 269	700, 000	400, 000
1877.....	500, 524	385, 885	750, 000	508, 400
1878.....	653, 773	491, 427	807, 527	622, 390
1879.....	829, 439	610, 682	834, 511	520, 231
1880.....	1, 074, 262	852, 196	1, 044, 382	732, 910
1881.....	1, 374, 247	1, 187, 770	1, 441, 719	1, 023, 740
1882.....	1, 514, 687	1, 284, 067	1, 673, 649	1, 235, 785
1883.....	1, 477, 345	1, 148, 709	1, 553, 380	1, 097, 174
1884.....	1, 375, 531	996, 983	1, 299, 676	784, 968
1885.....	1, 519, 430	959, 471	1, 304, 127	706, 583
1886.....	2, 269, 190	1, 574, 703	1, 570, 520	730, 343
1887.....	2, 936, 033	2, 101, 904	2, 089, 403	1, 021, 847
1888.....	2, 511, 161	1, 386, 277	2, 032, 794	979, 083
1889.....	2, 930, 204	1, 510, 057	2, 140, 791	943, 048
1890.....	3, 688, 871	1, 867, 837	2, 014, 843	1, 019, 606
1891.....	3, 247, 417	1, 293, 053	1, 642, 005	662, 676
1892.....	4, 168, 435	1, 537, 588	1, 500, 810	535, 836
1893.....	3, 215, 686	1, 129, 400	1, 493, 454	579, 386
1894.....	3, 571, 313	1, 016, 013	1, 535, 384	598, 530
1895.....	4, 909, 128	1, 299, 628	1, 535, 225	604, 338
1896.....	3, 919, 906	1, 116, 958	1, 815, 842	817, 476
1897.....	5, 475, 315	1, 644, 520	1, 884, 155	921, 131
1898.....	6, 609, 017	1, 976, 702	1, 759, 386	751, 591
1899.....	7, 586, 354	2, 270, 585	1, 825, 074	838, 148

**PRODUCTION OF OPEN-HEARTH STEEL INGOTS IN THE
UNITED STATES AND GREAT BRITAIN.**

The following table gives, in long tons, the production of open-hearth steel ingots in the United States from 1869 to 1899, and in Great Britain from 1873 to 1899.

Production of open-hearth steel ingots in the United States and Great Britain from 1869 to 1899.

Year.	United States.	Great Britain.	Year.	United States.	Great Britain.
	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>
1869.....	893	.....	1885.....	133,376	583,918
1870.....	1,339	.....	1886.....	218,973	694,150
1871.....	1,785	.....	1887.....	322,069	981,104
1872.....	2,679	.....	1888.....	314,318	1,292,742
1873.....	3,125	77,500	1889.....	374,543	1,429,169
1874.....	6,250	90,500	1890.....	513,232	1,564,200
1875.....	8,080	88,000	1891.....	579,753	1,514,538
1876.....	19,187	128,000	1892.....	669,889	1,418,830
1877.....	22,349	137,000	1893.....	737,890	1,456,309
1878.....	32,255	175,500	1894.....	784,936	1,575,318
1879.....	50,259	175,000	1895.....	1,137,182	1,754,737
1880.....	100,851	251,000	1896.....	1,298,700	2,317,555
1881.....	131,202	338,000	1897.....	1,608,671	2,601,806
1882.....	143,341	436,000	1898.....	2,230,292	2,806,600
1883.....	119,356	455,500	1899.....	2,947,316	3,030,251
1884.....	117,515	475,250			

PRODUCTION OF ALL KINDS OF STEEL IN THE UNITED STATES AND GREAT BRITAIN.

The following table gives, in long tons, the production of all kinds of crude steel in the United States from 1867 to 1899, and in Great Britain from 1873 to 1899. For the United States we have added to the Bessemer and open-hearth production the actual production of crucible and miscellaneous steel, and for Great Britain an estimated production of crucible and miscellaneous steel.

Production of all kinds of steel in the United States and Great Britain from 1867 to 1899.

Year.	United States.	Great Britain.	Year.	United States.	Great Britain.
	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>
1867.....	19,643	.....	1884.....	1,550,879	1,854,926
1868.....	26,786	.....	1885.....	1,711,920	1,968,045
1869.....	31,250	.....	1886.....	2,562,503	2,344,670
1870.....	68,750	.....	1887.....	3,339,071	3,150,507
1871.....	73,214	.....	1888.....	2,899,440	3,405,536
1872.....	142,954	.....	1889.....	3,385,732	3,669,960
1873.....	198,796	653,500	1890.....	4,277,071	3,679,043
1874.....	215,727	710,500	1891.....	3,904,240	3,256,543
1875.....	389,799	788,000	1892.....	4,927,581	3,019,640
1876.....	533,191	908,000	1893.....	4,019,995	3,049,763
1877.....	569,618	967,000	1894.....	4,412,032	3,210,702
1878.....	731,977	1,063,027	1895.....	6,114,834	3,389,962
1879.....	935,273	1,089,511	1896.....	5,281,689	4,233,397
1880.....	1,247,335	1,375,382	1897.....	7,156,957	4,585,961
1881.....	1,588,314	1,859,719	1898.....	8,932,857	4,665,986
1882.....	1,736,692	2,189,649	1899.....	10,639,857	5,000,000
1883.....	1,673,535	2,088,880			

GOLD AND SILVER.

PRODUCTION.

The product of gold in the United States for the calendar year 1899 amounted to 3,437,210 fine ounces, worth \$71,053,400, according to the statistics collected by the Director of the Mint. This is greater than the product of any other year in our history. The greatest increase was from Alaska, especially from the Cape Nome district. It is probable that this district will continue as a large producer. Large increases in gold production are also reported from Colorado, Utah, and South Dakota.

The product of silver amounted to 54,764,500 ounces, with a coining value of \$70,806,626, or with a commercial value of \$32,858,700. The total silver product showed only a very slight gain over the previous year. The greatest increase came from Montana, which showed a decrease in gold production. Utah also increased quite markedly, while Arizona and Idaho declined sufficiently to offset the increases.

The production by States is given in the tables below:

Product of gold and silver in the United States from 1792.

[The estimates for 1792 to 1873 are by Dr. R. W. Raymond, United States Mining Commissioner, and since by the Director of the Mint.]

Year.	Total.	Gold.	Silver.
April 2, 1792, to July 31, 1834..	\$14, 000, 000	\$14, 000, 000	Small.
July 31, 1834, to Dec. 31, 1844..	7, 750, 000	7, 500, 000	\$250, 000
1845.....	1, 058, 327	1, 008, 327	50, 000
1846.....	1, 189, 357	1, 139, 357	50, 000
1847.....	939, 085	889, 085	50, 000
1848.....	10, 050, 000	10, 000, 000	50, 000
1849.....	40, 050, 000	40, 000, 000	50, 000
1850.....	50, 050, 000	50, 000, 000	50, 000
1851.....	55, 050, 000	55, 000, 000	50, 000
1852.....	60, 050, 000	60, 000, 000	50, 000
1853.....	65, 050, 000	65, 000, 000	50, 000
1854.....	60, 050, 000	60, 000, 000	50, 000
1855.....	55, 050, 000	55, 000, 000	50, 000

MINERAL RESOURCES.

Product of gold and silver in the United States from 1792—Continued.

Year.	Total.	Gold.	Silver.
1856.....	\$55,050,000	\$55,000,000	\$50,000
1857.....	55,050,000	55,000,000	50,000
1858.....	50,500,000	50,000,000	500,000
1859.....	50,100,000	50,000,000	100,000
1860.....	46,150,000	46,000,000	150,000
1861.....	45,000,000	43,000,000	2,000,000
1862.....	43,700,000	39,200,000	4,500,000
1863.....	48,500,000	40,000,000	8,500,000
1864.....	57,100,000	46,100,000	11,000,000
1865.....	64,475,000	53,225,000	11,250,000
1866.....	63,500,000	53,500,000	10,000,000
1867.....	65,225,000	51,725,000	13,500,000
1868.....	60,000,000	48,000,000	12,000,000
1869.....	61,500,000	49,500,000	12,000,000
1870.....	66,000,000	50,000,000	16,000,000
1871.....	66,500,000	43,500,000	23,000,000
1872.....	64,750,000	36,000,000	28,750,000
1873.....	71,750,000	36,000,000	35,750,000
1874.....	70,800,000	33,500,000	37,300,000
1875.....	65,100,000	33,400,000	31,700,000
1876.....	78,700,000	39,900,000	38,800,000
1877.....	86,700,000	46,900,000	39,800,000
1878.....	96,400,000	51,200,000	45,200,000
1879.....	79,700,000	38,900,000	40,800,000
1880.....	75,200,000	36,000,000	39,200,000
1881.....	77,700,000	34,700,000	43,000,000
1882.....	79,300,000	32,500,000	46,800,000
1883.....	76,200,000	30,000,000	46,200,000
1884.....	79,600,000	30,800,000	48,800,000
1885.....	83,400,000	31,800,000	51,600,000
1886.....	86,000,000	35,000,000	51,000,000
1887.....	86,350,000	33,000,000	53,350,000
1888.....	92,370,000	33,175,000	59,195,000
1889:			
Mint.....	97,446,000	32,800,000	64,646,000
Census.....	99,282,866	32,888,180	66,396,686
1890.....	103,309,645	32,845,000	70,464,645
1891.....	108,591,565	33,175,000	75,416,565
1892.....	115,009,150	33,000,000	82,009,150
1893.....	113,525,757	35,950,000	77,575,757
1894.....	103,500,000	39,500,000	64,000,000
1895.....	118,661,000	46,610,000	72,051,000
1896.....	129,157,236	53,088,000	76,069,236
1897.....	127,000,172	57,363,000	69,637,172
1898.....	134,847,485	64,463,000	70,384,485
1899.....	141,860,026	71,053,400	70,806,626

GOLD AND SILVER.

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Production of silver in the United States in 1897 and 1898, and the increase or decrease in 1898, by States and Territories.

[Fine ounces.]

State or Territory.	1897.	1898.	Increase.	Decrease.
Alaska	116,400	92,400		24,000
Arizona	2,239,900	2,246,800	6,900	
California	474,400	642,300	167,900	
Colorado	21,636,400	22,815,600	1,179,200	
Georgia	600	500		100
Idaho	4,901,200	5,073,800	172,600	
Michigan	60,300	32,400		27,900
Montana	15,667,900	14,807,200		860,700
Nevada	1,228,900	805,000		423,900
New Mexico	539,500	425,300		114,200
North Carolina	300	700	400	
Oregon	69,000	130,000	61,000	
South Carolina	200	300	100	
South Dakota	147,600	152,300	4,700	
Texas	404,700	472,900	68,200	
Utah	6,265,600	6,485,900	220,300	
Washington	106,900	254,400	147,500	
Alabama				
Connecticut				
Minnesota				
Nebraska	200	200		
Tennessee				
Virginia				
Wyoming				
Total	53,860,000	54,438,000	578,000	

MINERAL RESOURCES.

Production of silver in the United States in 1898 and 1899, and the increase or decrease in 1899, by States and Territories.

[Fine ounces.]

State or Territory.	1898.	1899.	Increase.	Decrease.
Alaska	92,400	140,100	47,700	.....
Arizona	2,246,800	1,578,300	.....	668,500
California	642,300	824,300	182,000	.....
Colorado	22,815,600	22,662,900	.....	152,700
Georgia	500	400	.....	100
Idaho	5,073,800	3,851,800	.....	1,222,000
Maine .....	.....	500	500	.....
Michigan	32,400	112,800	80,400	.....
Montana	14,807,200	16,096,000	1,288,800	.....
Nevada	805,000	843,400	38,400	.....
New Mexico	425,300	503,300	78,000	.....
North Carolina	700	300	.....	400
Oregon	130,000	134,300	4,300	.....
South Carolina	300	400	100	.....
South Dakota	152,300	145,600	.....	6,700
Texas	472,900	520,000	47,100	.....
Utah	6,485,900	7,093,300	607,400	.....
Washington	254,400	256,000	1,600	.....
Other States	200	800	600	.....
Total	54,438,000	54,764,500	326,500	.....

GOLD AND SILVER.

123

Production of gold in the United States in 1897 and 1898, and the increase or decrease in 1898, by States and Territories.

[Fine ounces.]

State or Territory.	1897.	1898.	Increase.	Decrease.
Alaska	86,011	122,137	36,126	
Arizona	140,089	119,249		20,840
California	707,160	756,483	49,323	
Colorado	924,166	1,122,073	197,907	
Georgia	7,222	6,221		1,001
Idaho	82,320	83,055	735	
Michigan	3,033	5		3,028
Montana	211,563	248,014	36,451	
Nevada	143,983	144,859	876	
New Mexico	17,246	26,074	8,828	
North Carolina	1,674	4,064	2,390	
Oregon	65,456	56,966		8,490
South Carolina	4,097	5,041	944	
South Dakota	275,491	275,723	232	
Texas	358	14		344
Utah	83,500	110,556	27,056	
Washington	20,312	37,065	16,753	
Alabama				
Connecticut				
Iowa				
Maryland				
Minnesota	1,254	799		455
Nebraska				
Tennessee				
Vermont				
Virginia				
Wyoming				
Total	2,774,935	3,118,398	343,463	

MINERAL RESOURCES.

Production of gold in the United States in 1898 and 1899, and the increase or decrease in 1899, by States and Territories.

[Fine ounces.]

State or Territory.	1898.	1899.	Increase.	Decrease.
Alaska	122, 137	264, 104	141, 967	.....
Arizona	119, 249	124, 133	4, 884	.....
California	756, 483	735, 194	.....	21, 289
Colorado	1, 122, 073	1, 256, 920	134, 847	.....
Georgia	6, 221	5, 466	.....	755
Idaho	83, 055	91, 380	8, 325	.....
Maine .....	.....	174	174	.....
Michigan	5	5	.....	.....
Montana	248, 014	230, 270	.....	17, 744
Nevada	144, 859	107, 344	.....	37, 515
New Mexico	26, 074	28, 256	2, 182	.....
North Carolina	4, 064	1, 669	.....	2, 395
Oregon	56, 966	69, 152	12, 186	.....
South Carolina	5, 041	7, 745	2, 704	.....
South Dakota	275, 723	312, 962	37, 239	.....
Texas	14	334	320	.....
Utah	110, 556	166, 933	56, 377	.....
Washington	37, 065	33, 15C	.....	3, 909
Wyoming	257	1, 413	1, 156	.....
Other States	542	600	58	.....
Total	3, 118, 398	3, 437, 210	318, 812	.....

Approximate distribution, by producing States and Territories, of the product of gold and silver in the United States for the calendar year 1897.

[As estimated by the Director of the Mint.]

State or Territory.	Gold.		Silver.		Total value.
	Fine ounces.	Value.	Fine ounces.	Coining value.	
Alabama	358	\$7, 400	100	\$129	\$7, 529
Alaska	86, 011	1, 778, 000	116, 400	150, 497	1, 928, 497
Arizona	140, 089	2, 895, 900	2, 239, 900	2, 896, 032	5, 791, 932
California	707, 160	14, 618, 300	474, 400	613, 366	15, 231, 666
Colorado	924, 166	19, 104, 200	21, 636, 400	27, 974, 335	47, 078, 535
Georgia	7, 222	149, 300	600	776	150, 076
Idaho	82, 320	1, 701, 700	4, 901, 200	6, 336, 905	8, 038, 605
Iowa	5	100	.....	.....	100
Maryland	5	100	.....	.....	100
Michigan	3, 033	62, 700	60, 300	77, 964	140, 664
Minnesota	145	3, 000	.....	.....	3, 000
Montana	211, 563	4, 373, 400	15, 667, 900	20, 257, 487	24, 630, 887
Nevada	143, 983	2, 976, 400	1, 228, 900	1, 588, 881	4, 565, 281
New Mexico	17, 246	356, 500	539, 500	697, 535	1, 054, 035
North Carolina ...	1, 674	34, 600	300	388	34, 988
Oregon	65, 456	1, 353, 100	69, 000	89, 212	1, 442, 312
South Carolina	4, 097	84, 700	200	259	84, 959
South Dakota	275, 491	5, 694, 900	147, 600	190, 836	5, 885, 736
Tennessee	5	100	.....	.....	100
Texas	358	7, 400	404, 700	523, 249	530, 649
Utah	83, 500	1, 726, 100	6, 265, 600	8, 100, 978	9, 827, 078
Vermont	5	100	.....	.....	100
Virginia	189	3, 900	.....	.....	3, 900
Washington	20, 312	419, 900	106, 900	138, 214	558, 114
Wyoming	542	11, 200	100	129	11, 329
Total	2, 774, 935	57, 363, 000	53, 860, 000	69, 637, 172	127, 000, 172

MINERAL RESOURCES.

Approximate distribution, by producing States and Territories, of the product of gold and silver in the United States for the calendar year 1898.

[As estimated by the Director of the Mint.]

State or Territory.	Gold.		Silver.		Total value.
	Fine ounces.	Value.	Fine ounces.	Coining value.	
Alabama	242	\$5,000	100	\$129	\$5,129
Alaska	122,137	2,524,800	92,400	119,467	2,644,267
Arizona	119,249	2,465,100	2,246,800	2,904,954	5,370,054
California	756,483	15,637,900	642,300	830,448	16,468,348
Colorado	1,122,073	23,195,300	22,815,600	29,498,958	52,694,258
Georgia	6,221	128,600	500	646	129,246
Idaho	83,055	1,716,900	5,073,800	6,560,065	8,276,965
Iowa	5	100	-----	-----	100
Maryland	29	600	-----	-----	600
Michigan	5	100	32,400	41,891	41,991
Minnesota	5	100	-----	-----	100
Montana	248,014	5,126,900	14,807,200	19,144,663	24,271,563
Nevada	144,859	2,994,500	805,000	1,040,808	4,035,308
New Mexico	26,074	539,000	425,300	549,883	1,088,883
North Carolina	4,064	84,000	700	905	84,905
Oregon	56,966	1,177,600	130,000	168,081	1,345,681
South Carolina	5,041	104,200	300	388	104,582
South Dakota	275,723	5,699,700	152,300	196,913	5,896,613
Tennessee	43	900	-----	-----	900
Texas	14	300	472,900	611,426	611,726
Utah	110,556	2,285,400	6,485,900	8,385,810	10,671,210
Virginia	218	4,500	-----	-----	4,500
Washington	37,065	766,200	254,400	328,921	1,095,121
Wyoming	257	5,300	100	129	5,429
Total	3,118,398	64,463,000	54,438,000	70,384,485	134,847,485

GOLD AND SILVER.

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Approximate distribution, by producing States and Territories, of the product of gold and silver in the United States for the calendar year 1899.

[As estimated by the director of the Mint.]

State or Territory.	Gold.		Silver.		Total value.
	Fine ounces.	Value.	Fine ounces.	Coining value.	
Alabama	208	\$4,300	100	\$129	\$4,429
Alaska	264,104	5,459,500	140,100	181,140	5,640,640
Arizona	124,133	2,566,100	1,578,300	2,040,630	4,606,730
California	735,194	15,197,800	824,300	1,065,762	16,263,562
Colorado	1,256,920	25,982,800	22,662,900	29,301,527	55,284,327
Georgia	5,466	113,000	400	517	113,517
Idaho	91,380	1,889,000	3,851,800	4,980,105	6,869,105
Maine	174	3,600	500	646	4,246
Maryland	39	800	100	129	929
Michigan	5	100	112,800	145,843	145,943
Missouri	5	100	100	129	229
Montana	230,270	4,760,100	16,096,000	20,810,990	25,571,090
Nevada	107,344	2,219,000	843,400	1,090,457	3,309,457
New Mexico	28,256	584,100	503,300	650,731	1,234,831
North Carolina	1,669	34,500	300	388	34,888
Oregon	69,152	1,429,500	134,300	173,641	1,603,141
South Carolina	7,745	160,100	400	517	160,617
South Dakota	312,962	6,469,500	145,600	188,251	6,657,751
Texas	334	6,900	520,000	672,323	679,223
Utah	166,933	3,450,800	7,093,300	9,171,135	12,621,935
Vermont	5	100	-----	-----	100
Virginia	343	7,100	100	129	7,229
Washington	33,156	685,400	256,000	330,990	1,016,390
Wyoming	1,413	29,200	400	517	29,717
Total	3,437,210	71,053,400	54,764,500	70,806,626	141,860,026

MANGANESE ORES.

By JOHN BIRKINBINE.

PRODUCTION OF MANGANESE ORES.

Although the year 1899 was one of great activity in all branches of the iron and steel industry, there was less manganese ore mined in the United States than for several years, the total being 9,935 long tons. In fact there have been but seven years in the last two decades when the production of American manganese ores was less than in 1899. This was in spite of the fact that the advancing prices for raw or manufactured material encouraged some new exploitations, but as will be seen later the importations of manganese ores in 1899 were largely in excess of 1898, and the domestic output of manganiferous iron ores was considerably augmented.

It is unfortunate that present developments have produced such a limited supply of domestic manganese ores and that most of those used are imported from other countries. Foreign complications may, by restricting the importations of manganese ores, handicap the steel industry of the United States, which is the principal source of consumption of manganese ores and of much of the manganiferous ores.

In rating the mineral as manganese ores or as manganiferous iron ores the distinction which has been generally accepted is made on a content of 44 per cent manganese. That is, ores which when dried at 212° contain 44 per cent or more of manganese are classed as manganese ores, while those carrying smaller percentages are rated as manganiferous iron ores, unless they have less than 3 per cent of iron.

In this connection it will be interesting to quote the decisions of the United States Treasury Department as to what is a manganese ore.

Treasury Decision 4114 provides that ore to be classed as manganese ore must contain 50 per cent or over of manganese, and not over 10 per cent of iron. This was modified in Treasury Decision 16550, which allowed certain ore containing less than 50 per cent of manganese to be classed as manganese ore when the iron therein was less than 3 per cent.

The total production of manganese ores in the United States in the year 1899 was 9,935 long tons, valued at \$82,278, or \$8.28 per ton. Nine States contributed to the total. Virginia, after occupying a subordinate position for seven years, again heads the list of States with a production of 6,228 tons, or 62.7 per cent of the total for the country, followed by Georgia. Arkansas has shown a marked decline in production. Alabama has ceased to mine any manganese ore, but Missouri has been added to the list, while North Carolina, Pennsylvania, and West Virginia have resumed as small contributors.

Colorado produces ores which in this report are, according to custom, classed as manganiferous iron ores, but locally they are considered as ores of manganese, as they contain from 20 to 43 per cent of this metal.

While there has been a falling off in the amount of manganese mined in 1899 of 6,022 tons, or 37.7 per cent, from the product of 1898, the average value has increased from \$8.10 per ton in 1898 to \$8.28 in 1899, a gain of 18 cents per ton, or 2.2 per cent.

The production and value at the mines of manganese ores by States in 1896, 1897, 1898, and 1899 are as follows, the earlier years being given for the purpose of comparison:

Amount and value of manganese ores produced in the United States in 1896, 1897, 1898, and 1899.

State.	1896.			1897.		
	Product.	Total value.	Average value per ton.	Product.	Total value.	Average value per ton.
	<i>Long tons.</i>			<i>Long tons.</i>		
Alabama						
Arkansas	3, 421	\$36, 686	\$10. 72	3, 240	\$33, 708	\$10. 40
California	284	3, 415	12. 02	484	2, 788	5. 76
Georgia	4, 085	27, 032	6. 62	3, 332	22, 084	6. 63
Michigan				37	370	10. 00
Missouri						
North Carolina	2	17	8. 50			
Pennsylvania	265	1, 988	7. 50	354	2, 832	8. 00
Tennessee	<i>None.</i>	<i>None.</i>		11	93	8. 45
Virginia	2, 018	21, 485	10. 65	3, 650	33, 630	9. 21
West Virginia	13	194	8. 00	<i>None.</i>	<i>None.</i>	<i>None.</i>
Total	10, 088	90, 727	8. 99	11, 108	95, 505	8. 60

State.	1898.			1899.		
	Product.	Total value.	Average value per ton.	Product.	Total value.	Average value per ton.
	<i>Long tons.</i>			<i>Long tons.</i>		
Alabama	22	<i>a</i> \$143	<i>a</i> \$6. 50			
Arkansas	2, 662	26, 035	9. 78	356	\$3, 781	\$10. 62
California	541	3, 222	5. 96	115	855	7. 43
Georgia	6, 689	41, 571	6. 21	3, 089	23, 377	7. 57
Michigan						
Missouri				16	160	10. 00
North Carolina				90	765	8. 50
Pennsylvania				12	58	4. 83
Tennessee	381	2, 276	5. 97	19	133	7. 00
Virginia	5, 662	55, 938	9. 88	6, 228	53, 069	8. 52
West Virginia				10	80	8. 00
Total	15, 957	129, 185	8. 10	9, 935	82, 278	8. 28

a Estimated

This table indicates a decided decline in the more important producing States, with the exception of Virginia, where a considerable amount of prospecting was done during the last year or two. The 1899 product for the country, 9,935 tons, is the lowest since the year 1895, and with but three exceptions the smallest since 1883.

The falling off in Arkansas is due to the curtailed output of the largest producer; but this State, as well as Georgia, has deposits of manganese ore in reserve. Georgia, however, shows a decline, and has been relegated to second position as a contributor of manganese ore.

The remaining States mine but little manganese ore, and have been grouped together in the table, which shows the output of manganese ores in the three principal States, and the total for the United States, from the year 1880 to 1899, inclusive.

Production of manganese ores in the United States from 1880 to 1899.

[Maxima are given in italics.]

Year.	Virginia.	Arkansas.	Georgia.	Other States.	Total.	Total value.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	
1880....	3,661	.....	1,800	300	5,761	\$86,415
1881....	3,295	100	1,200	300	4,895	73,425
1882....	2,982	175	1,000	375	4,532	67,980
1883....	5,355	400	.....	400	6,155	92,325
1884....	8,980	800	.....	400	10,180	122,160
1885....	18,745	1,483	2,580	450	23,258	190,281
1886....	<i>20,567</i>	3,316	6,041	269	30,193	277,636
1887....	19,835	5,651	<i>9,024</i>	14	<i>34,524</i>	<i>333,844</i>
1888....	17,646	4,312	5,568	1,672	29,198	279,571
1889....	14,616	2,528	5,208	1,845	24,197	240,559
1890....	12,699	5,339	749	<i>6,897</i>	25,684	219,050
1891....	16,248	1,650	3,575	1,943	23,416	239,129
1892....	6,079	<i>6,708</i>	826	.....	13,613	129,586
1893....	4,092	2,020	724	882	7,718	66,614
1894....	1,797	1,934	1,277	1,300	6,308	53,635
1895....	1,715	2,991	3,856	985	9,547	71,769
1896....	2,018	3,421	4,085	564	10,088	90,727
1897....	3,650	3,240	3,332	886	11,108	95,505
1898....	5,662	2,662	6,689	944	15,957	129,185
1899....	6,228	356	3,089	262	9,935	82,278
Total for 20 years.	175,870	49,086	60,623	20,688	306,267	2,941,674

PRODUCTION OF MANGANIFEROUS IRON ORES.

As in former reports, the production of manganiferous iron ores in the year 1899 are included in the report on iron ores, but the production and value are also given here. Some of the Colorado ores are used in the manufacture of spiegeleisen, but a considerable portion of the ores of that State are used as a flux by the smelters of the precious metals.

Some of the Lake Superior iron ores contain small percentages of manganese, which moderately affect their values.

The quantity of manganiferous iron ore produced in the United States during 1899, the percentages of manganese which they contain, and the value of ores at the mines are given in the following table:

Production of manganiferous iron ores in 1899.

Locality.	Quantity.	Manganese.	Average value per ton at mine.	Total value.
	<i>Long tons.</i>	<i>Per cent.</i>		
Colorado	29,355	16.00 to 43	\$2.95	\$86,697
Lake Superior region..	732,490	.68 to 8	1.45	1,060,350
Total	761,845	.68 to 43	1.51	1,147,047

The following table gives the production, the total value, and the average value per ton of the manganiferous iron ores mined in the United States from 1889 to 1899, inclusive. It indicates that the quantity of this ore which was won in 1899 approximates the combined output for the three preceding years.

Total production of manganiferous iron ores in the United States from 1889 to 1899.

[Maxima in italics.]

Year.	Total product.	Total value.	Average value per ton.
	<i>Long tons.</i>		
1889.....	83,434	\$271,680	\$3.26
1890.....	61,863	231,655	3.74
1891.....	132,511	314,099	2.37
1892.....	153,373	354,664	2.31
1893.....	117,782	283,228	2.40
1894.....	205,488	408,597	1.99
1895.....	125,729	233,998	1.86
1896.....	338,712	726,413	2.14
1897.....	202,304	343,784	1.70
1898.....	287,810	429,302	1.49
1899.....	761,845	1,147,047	1.51

In mining the precious metals a considerable amount of ore is won which contains manganese, iron, and a moderate quantity of silver, the latter metal often being insufficient to make the ore valuable on that account, but it is used as a flux at the smelters and is classed as an iron ore, being included in the report for 1899 on iron ores. The quantity of this class of ore mined in the United States from 1889 to 1899, inclusive, the value, and the average value per ton, is as follows:

Production of mangiferous silver ores in the United States from 1889 to 1899.

[Maxima in italics.]

Year.	Quantity.	Value.	Average value per ton.
	<i>Long tons.</i>		
1889.....	64,987	\$227,455	\$3.50
1890.....	51,840	181,440	3.50
1891.....	79,511	397,555	5.00
1892.....	62,309	323,794	5.20
1893.....	<i>a</i> 55,962	258,695	4.75
1894.....	<i>b</i> 31,687	148,292	4.84
1895.....	54,163	229,651	4.24
1896.....	138,079	416,020	3.01
1897.....	<i>149,502</i>	<i>424,151</i>	2.84
1898.....	99,651	295,412	2.96
1899.....	79,855	266,343	3.34

a Including 1,500 tons from Montana, for which no value is given.

b Including 1,049 tons from Montana, for which no value is given.

Large quantities of franklinite are obtained in New Jersey, and after the zinc is extracted by roasting, the residuum or clinker contains considerable iron and manganese and also a small quantity of zinc. This is used in the manufacture of spiegeleisen in small blast furnaces in New Jersey and eastern Pennsylvania. The annual production of this zinc residuum, its value, and the average value per ton, from 1889 to 1899, inclusive, is given in the accompanying table.

It will be noted that the quantity of clinker used as iron ore in 1899 exceeded the previous maximum of 1890 by 16,450 tons:

Production of manganiferous zinc ore residuum in the United States from 1889 to 1899.

[Maxima in italics.]

Year.	Quantity.	Value.	Average value per ton.
	<i>Long tons.</i>		
1889.....	43,648	\$54,560	\$1.25
1890.....	48,560	60,700	1.25
1891.....	38,228	57,432	1.50
1892.....	31,859	25,937	.81
1893.....	37,512	30,535	.81
1894.....	28,981	20,464	.76
1895.....	43,249	24,451	.57
1896.....	44,953	20,455	.46
1897.....	33,924	18,713	.55
1898.....	48,502	<i>a</i> 26,676	<i>a</i> .55
1899.....	65,010	32,505	.50

a Estimated.

PRODUCTION OF MANGANESE AND MANGANIFEROUS ORES REPORTED IN 1899.

To give a résumé of the production, total value, and average value of the ores of manganese and those which also contain smaller percentages of this metal the accompanying statement, prepared from the various classifications mentioned, has been prepared:

Production of manganese and manganiferous ores in the United States in the year 1899.

Kind of ore.	Quantity.	Value.	Average value per ton.
	<i>Long tons.</i>		
Manganese ore.....	9,935	\$82,278	\$8.28
Manganiferous iron ore.....	761,845	1,147,047	1.51
Manganiferous silver ore.....	79,855	266,343	3.34
Manganiferous zinc ore.....	65,010	32,505	0.50
Totals and average.....	916,645	1,528,173	1.67

Although the nation's product of manganese ore is small, the utilization of manganiferous ores indicates that a considerable quantity is required.

PRODUCTION OF MANGANESE BY STATES.

The production of manganese ore by individual States will next receive consideration.

ARKANSAS.

The Batesville district, in the northern central part of Arkansas, produced all of the manganese ore credited to that State in 1899, but owing to the restricted operations of the principal producer the total amount was much less than in 1898.

Some ore is of good quality, the better class containing 50 per cent of manganese, but much of it carries phosphorus above the limit prescribed. The extent of the deposits is uncertain, operations upon them are limited, and there is considerable distance to be covered to points of consumption.

The total production of manganese ore in the Batesville district from 1850 to 1899, inclusive, was 49,656 long tons, and the detailed record found below shows that the maximum output, 6,708 tons, was in 1892.

Production of manganese in the Batesville district of Arkansas to December 31, 1899.

[Maximum in italics.]

Year.	Authority.	Quantity.
		<i>Long tons.</i>
1850 to 1867	Estimated	400
1868	do	10
1881	Railroad reports of shipments	100
1882	do	175
1883	do	400
1884	do	800
1885	Mineral Resources of the United States	1,483
1886	do	3,316
1887	do	5,651
1888	do	4,312
1889	Eleventh Census	2,528
1890	Mineral Resources of the United States	5,339
1891	do	1,650
1892	do	6,708
1893	do	2,180
1894	do	1,934
1895	do	2,991
1896	do	3,421
1897	do	3,240
1898	do	2,662
1899	do	356
Total .....	.....	49,656

CALIFORNIA.

Manganese ores occur in several of the counties of California, but Alameda is the only county in which these ores have been mined in late years. The ores are of high grade and are used to a considerable extent in the production of chlorine. The annual output from 1874 to 1899, inclusive, is given below; the total being 9,771 long tons, the product in 1899 of 115 tons being the lowest since 1892.

Total production of manganese ores in California to December 31, 1899.

Year.	Quantity.	Year.	Quantity.
	<i>Long tons.</i>		<i>Long tons.</i>
1874 to 1888.....	6,000	1895.....	525
1889.....	53	1896.....	284
1890.....	386	1897.....	484
1891.....	705	1898.....	541
1892.....		1899.....	115
1893.....	400	Total.....	9,771
1894.....	278		

COLORADO.

The ores of Colorado which carry manganese are not, truly speaking, manganese ores (although some true manganese ores have been reported), but are manganiferous and argentiferous iron ores carrying varying percentages of manganese. Some are used in the manufacture of spiegeleisen and the balance as a flux by the smelters. The ores used in the manufacture of spiegeleisen contain from 20 to 43 per cent of manganese. The growing steel industry of Colorado, added to the shipments to other steel works, indicate a continued liberal exploitation of deposits of manganiferous iron ores. Most of those now used are mined in the vicinity of Leadville.

The appended table gives the production of these ores from 1889 to 1899 inclusive.

Production of manganiferous ores in Colorado from 1889 to 1899.

	1889.	1890.	1891.	1892.	1893.	1894.
	<i>Longtons.</i>	<i>Longtons.</i>	<i>Longtons.</i>	<i>Longtons.</i>	<i>Longtons.</i>	<i>Long tons.</i>
Manganiferous iron ores used for pro- ducing spiegeleisen	2,075	.....	964	3,100	5,766	7,022
Manganiferous sil- ver ores	64,987	51,840	79,511	62,309	54,462	30,187
Total.....	67,062	51,840	80,475	65,409	60,228	37,209

Production of manganese ores in Colorado from 1889 to 1899—Continued.

	1895.	1896.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Manganiferous iron ores used for producing spiegeleisen	13,464	9,072	16,519	18,848	29,355
Manganiferous silver ores	53,506	137,597	149,502	99,651	79,855
Total.....	66,970	146,669	166,021	118,499	109,210

GEORGIA.

The greater portion of the manganese ores mined in Georgia comes from the Cartersville district, but the State as a whole showed a decline from 6,689 long tons in 1898, when it occupied first position, to but 3,089 long tons in 1899. The deposits are mostly limited in size and scattered.

The total production in Georgia to date, as near as can be ascertained, is 80,573 long tons, the accompanying table giving the yearly output:

Production of manganese ores in Georgia from 1866 to 1899, inclusive.

Year.	Quantity.	Year.	Quantity.
	<i>Long tons.</i>		<i>Long tons.</i>
From 1866 to 1873 (estimated).....	5,550	1887.....	9,024
1874.....	2,400	1888.....	5,568
1875.....	2,400	1889.....	5,208
1876.....	2,400	1890.....	749
1877.....	2,400	1891.....	3,575
1878.....	2,400	1892.....	826
1879.....	2,400	1893.....	724
1880.....	1,800	1894.....	1,277
1881.....	1,200	1895.....	3,856
1882.....	1,000	1896.....	4,085
1883 and 1884.....	(a)	1897.....	3,332
1885.....	2,580	1898.....	6,689
1886.....	6,041	1899.....	3,089
		Total...	80,573

a None reported.

LAKE SUPERIOR REGION.

Occasionally small amounts of manganese ores are produced in the States tributary to Lake Superior, but a considerable amount of iron ore, containing usually from 4 to 8 per cent of manganese, is mined, which is included in the annual report on iron ores. The amount of this variety of iron ore produced in the year 1899, together with that of previous years subsequent to 1885, as well as the average per cent of manganese, is given in the following table, and demonstrates a greatly augmented output over preceding years.

Production of manganiiferous iron ores in the Lake Superior region from 1886 to 1899.

Year.	Product.	Average per cent of manganese.	Year.	Product.	Average per cent of manganese.
	<i>Tons.</i>			<i>Tons.</i>	
1886.....	100,000	2		27,353	4.67
	157,000	4		55,009	7.61
Total..	257,000		1893.....	15,102	7.77
				5,051	10.40
1887.....	200,000	4		7,833	14
	10,000	10		300	22
Total..	210,000		Total..	110,648	
1888.....	189,574	4		50,763	3.07
	11,562	11		57,872	3.55
Total..	201,136		1894.....	6,264	6.50
				61,817	7.26
1889.....	50,018	6.74		14,610	7.75
	31,341	9+		7,140	18
Total..	81,359		Total..	198,466	
1890.....	61,863				
	13,711	4.68 to 17.96		13,752	8
1891.....	11,015	10	1895.....	10,228	7.608
	9,213	9.68		10,000	7.5
	98,572	5.38		26,500	7.26
Total..	132,511			51,785	3.536
			Total..	112,265	
1892.....	6,710	4.893		69,139	7.44
	102,695	5	1896.....	47,000	5.75
	7,500	8		18,900	5
	8,272	9.998		104,156	4.3
	22,254	12.028		38,590	3.22
Total..	147,431			51,855	3.1
			Total..	329,640	

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Production of manganiferous iron ores in the Lake Superior region from 1886 to 1899—Continued.

Year.	Product.	Average per cent of manganese.	Year.	Product.	Average per cent of manganese.
	<i>Tons.</i>			<i>Tons.</i>	
1897.....	18,000	4	1899.....	484,784	.68 to 3.6
	38,489	5.85		39,325	4.02
	92,872	6.99		94,708	5 to 6
	30,500	7.57		113,673	6 to 8
	35	14.5	Total..	732,490	
	4,689	(a)			
Total..	184,585				
1898.....	80,363	5 to 7			
	35,000	6.8			
	153,499	6			
Total..	268,862				

a Not given.

MISSOURI.

Missouri sent a shipment of 16 tons of manganese ore to one of the steel companies in 1899, more in the nature of a sample carload than as the opening of regular mining operations.

NORTH CAROLINA.

North Carolina is stated to have deposits of good manganese ore, which have been from time to time exploited in a small way, but the amount mined in 1899 was only 90 tons.

PENNSYLVANIA.

Mr. C. Wharton, jr., in describing the mines operated in Cumberland County, states that there is considerable ore obtainable, averaging from 40 to 45 per cent manganese, but high in phosphorus, viz, 0.2 to 0.6 per cent. After the clay covering was removed a bed of manganiferous iron ore, 10 to 12 feet thick, was encountered, the ore carrying 40 to 50 per cent of iron and 4 to 10 per cent of manganese; under this was a second bed containing the manganese ore. Owing to the composition of the ore and the business depression in 1898 mining was abandoned, but another mine in this vicinity contributed a small amount in 1899.

The annual production of manganese ore in Pennsylvania from 1894 to 1899 is shown in the following table:

Production of manganese ores in Pennsylvania from 1894 to 1899.

Year.	Production.	Value.
	<i>Long tons.</i>	
1894.....	35	
1895.....	460	\$2, 300
1896.....	265	1, 988
1897.....	354	2, 832
1898.....		
1899.....	12	58

TENNESSEE.

This State has mined small amounts of manganese ore at intervals. The abandonment of manganese mining by the principal contributor to the total for 1898 has reduced the output of 1899 to 19 tons. The production in 1897, 1898, and 1899 was as follows:

Production of manganese ores in Tennessee from 1897 to 1899.

Year.	Production.
	<i>Long tons.</i>
1897.....	11
1898.....	381
1899.....	19

VIRGINIA.

Prior to 1894 when the Crimora mine was producing liberally, Virginia annually contributed the major portion of the manganese ores mined in the United States, but when this deposit became depleted the output declined to 1,797 tons in 1894 and 1,715 tons in 1895. There has since been a gradual revival of the industry, each year showing an increase over its predecessor, until in 1899 6,228 tons were mined, the largest amount since 1891.

The annual production from 1880 to 1899, inclusive, was as follows:

Production of manganese ores and manganiferous iron ores in Virginia from 1880 to 1899.

[Maxima in italics.]

Year.	Manga- nese ores.	Manganif- erous iron ores.	Year.	Manga- nese ores.	Manganif- erous iron ores.
	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>
1880.....	3, 661	.....	1891.....	16, 248	.....
1881.....	3, 295	.....	1892.....	6, 079	<i>2, 842</i>
1882.....	2, 982	.....	1893.....	4, 092	1, 188
1883.....	5, 355	.....	1894.....	1, 797	132
1884.....	8, 980	.....	1895.....	1, 715	.....
1885.....	18, 745	.....	1896.....	2, 018	.....
1886.....	<i>20, 567</i>	.....	1897.....	3, 650	.....
1887.....	19, 835	.....	1898.....	5, 662	.....
1888.....	17, 646	.....	1899.....	6, 228	.....
1889.....	14, 616	.....	Total...	175, 870	.....
1890.....	12, 699	.....		

IMPORTS OF MANGANESE ORES.

The ferromanganese and spiegel industry of the United States, owing to the small native production of manganese ores, is dependent mostly upon foreign sources of supply for this mineral, but some of the domestic manganiferous iron ores are utilized to produce these metals. The imports of manganese ores in 1899 were 188,349 long tons, an increase of 73,464 long tons, or 64 per cent, over the quantity received in 1898, owing principally to augmented shipments from Russia, Brazil, Chile, and British East Indies, and the resumption of commercial relations with Cuba.

The average value of the manganese ore imported in 1899 was \$8.41 per ton as against but \$7.24 in 1898. The high valuation placed by the customs officers on the ores imported from the United Kingdom, Nova Scotia, New Brunswick, etc., and Germany is probably due to other chemical components than manganese.

The following figures, supplied by the Bureau of Statistics of the Treasury Department, show the amount and value, by countries, of manganese ores imported during the year 1899:

Manganese ores imported into the United States during the calendar year 1899.

Country.	Quantity.	Value.
	<i>Long tons.</i>	
Russia, Black Sea.....	73,397	\$598,644
Brazil.....	28,115	299,877
British East Indies.....	17,950	54,471
Chile.....	17,575	111,726
Cuba.....	16,359	221,785
Colombia.....	8,900	82,489
Turkey in Europe.....	8,310	61,241
Turkey in Asia.....	5,782	46,822
Japan.....	4,492	31,657
Greece.....	3,030	10,526
France.....	2,953	21,080
Germany.....	1,274	34,927
United Kingdom.....	134	6,697
Nova Scotia, New Brunswick, etc.....	78	2,586
Total.....	188,349	1,584,528

The table suggests that the American steel industry draws upon various portions of the world for the manganese ores which are used, and that it is possible to find contributions from most of the countries named, in the stock yard of a blast furnace operated to produce ferro-manganese.

The importations of manganese ores, by customs districts, show that nearly one-half the ore came to the port of Philadelphia, followed by Baltimore, New York, etc., as indicated by the accompanying table.

Manganese ore imported into the United States during the calendar year 1899, by customs districts.

Customs district.	Quantity.	Value.
	<i>Long tons.</i>	
Philadelphia, Pennsylvania.....	90,583	\$655,061
Baltimore, Maryland.....	80,006	739,547
New York, N. Y.....	14,762	152,959
Norfolk, Virginia.....	2,901	32,248
Pittsburg, Pennsylvania.....	44	2,473
Newport News, Virginia.....	26	1,351
Chicago, Illinois.....	16	595
Boston, Massachusetts.....	5	116
Passamaquoddy, Maine.....	4	82
All others.....	2	96
Total.....	188,349	1,584,528

Comparison of the amounts of manganese ore produced in this country in the last eleven years and those imported demonstrate that an average of nearly five times as much ore was imported as produced, and the percentage of importations has been increasing in late years, as will be seen from the annexed table.

Relative quantities and values of domestic and imported manganese ores from 1889 to 1899.

Year.	Domestic production.		Imports.	
	Quantity.	Value.	Quantity.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
1889.....	24,197	\$240,559	4,286	\$78,391
1890.....	25,684	219,050	34,154	516,900
1891.....	23,416	239,129	28,825	380,618
1892.....	13,613	129,586	58,572	840,811
1893.....	7,718	66,614	68,113	880,238
1894.....	6,308	53,635	44,655	432,561
1895.....	9,547	71,769	86,111	747,910
1896.....	10,088	90,727	31,489	250,468
1897.....	11,108	95,505	119,961	1,023,824
1898.....	15,957	129,185	114,885	831,967
1899.....	9,935	82,278	188,349	1,584,528
Total for 11 years	157,571	1,418,037	779,400	7,568,216
Average for 11 years.....	14,325	128,912	70,855	688,020

PRODUCTION OF MANGANESE IN FOREIGN COUNTRIES.

CANADA.

The limited amount of manganese ore mined in Canada is from New Brunswick and Nova Scotia. The data showing the annual production and value, as well as the exports, of manganese ore were supplied by Mr. George M. Dawson, director of the geological survey of Canada. The annual production of manganese ore in Canada and the total value and value per ton from 1886 to 1899, inclusive, has been as follows:

Production of manganese ore in Canada from 1886 to 1899.

Year.	Production.	Value.	Value per ton.
	<i>Short tons.</i>		
1886.....	1,789	\$41,499	\$23.20
1887.....	1,245	43,658	35.07
1888.....	1,801	47,944	26.62
1889.....	1,455	32,737	22.50
1890.....	1,328	32,550	24.51
1891.....	255	6,694	26.25
1892.....	115	10,250	89.13
1893.....	213	14,578	68.44
1894.....	74	4,180	56.49
1895.....	125	8,464	67.71
1896 <i>a</i>	123½	3,975	32.19
1897 <i>a</i>	15½	1,166	76.46
1898.....	50	1,600	32.00
1899 <i>b</i>	1,581	20,004	12.66

a Exports. *b* Nova Scotia mined 308 tons. New Brunswick's product is estimated at 1,273 tons.

The exports of manganese ore from Nova Scotia and New Brunswick from 1873 to 1899, inclusive, are as follows:

Exports of manganese ore from Canada, 1873 to 1899, inclusive.

Year.	Nova Scotia.		New Brunswick.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>		<i>Short tons.</i>	
1873.....			1,031	\$20,192	1,031	\$20,192
1874.....	6	\$12	776	16,961	782	16,973
1875.....		200	194	5,314	203	5,514
1876.....	21	723	391	7,316	412	8,039
1877.....	106	3,699	785	12,210	891	15,909
1878.....	106	4,880	520	5,971	626	10,860
1879.....	154	7,420	1,732	20,016	1,886	27,436
1880.....	79	3,090	2,100	31,707	2,179	34,797
1881.....	200	18,022	1,504	22,532	1,704	40,554
1882.....	123	11,520	771	14,227	894	25,747
1883.....	313	8,635	1,013	16,708	1,326	25,343
1884.....	134	1,054	469	9,035	603	20,089
1885.....	77	5,054	1,607	29,695	1,684	34,649
1886.....	<i>a</i> 441	854	1,377	27,484	<i>a</i> 1,818	58,338
1887.....	578	14,240	837	20,562	1,415	34,802
1888.....	87	5,759	1,094	16,073	1,181	21,832
1889.....	59	3,024	1,377	26,326	1,436	29,350
1890.....	177	2,583	1,729	34,248	1,906	36,831
1891.....	22	563	233	6,131	255	6,694
1892.....	84	6,180	59	2,025	143	8,205
1893.....	123	12,409	10	112	133	12,521
1894.....	11	720	45	2,400	56	3,120
1895.....	108	6,348	³ / ₁₆	3	108 ³ / ₁₆	6,351
1896.....	123 ¹ / ₂	3,975	.....	.....	123 ¹ / ₂	3,975
1897.....	15 ¹ / ₂	1,166	.....	.....	15 ¹ / ₂	1,166
1898.....	11	325	.....	.....	11	325
1899.....	67	2,328	3	82	70	2,410

a 250 tons should be more correctly classed under the heading of mineral pigments.

NOVA SCOTIA.

Mr. E. Gilpin, jr., A. M., in a report on "The Minerals of Nova Scotia, Canada," prepared for the Paris Exposition, says:

Manganese ores are common in the Carboniferous and Devonian rocks of several parts of the Province. The most continuous mining of this ore has been carried on at Tene Cape, in Hants County. Here the ore is a very pure binoxide, presented as pockets and irregular veins in limestone. The annual production from this district has seldom exceeded 200 tons, most of which, it is said, is used by glass makers.

Near Truro, and in connection with the limonite deposits of Pictou County, considerable amounts of a similar grade of manganese ore have been mined at different times. Promising deposits occur on the College lands, Lunenburg County.

In Cape Breton County, near Loch Lomond, a good quality of the ore occurs in connection with limestone and slates, and is worked to a small extent. Hitherto only the higher grade ores have been worked in Nova Scotia.

NEWFOUNDLAND.

Newfoundland mined 1,500 long tons of manganese ore in 1897.

WEST INDIES.

CUBA.

During the years 1890 to 1893, inclusive, considerable quantities of manganese ores were shipped from Cuba, but these ceased in 1895, owing to the depression of the iron and steel industry, and were not resumed until the close of the Spanish-American war, in the latter part of 1898. In 1899, 13,686 tons were shipped from the Ponupo mines.

The exports from 1888 to 1899 were as follows:

Exports of manganese ore from Santiago district, Cuba, from 1888 to 1899.

Year.	Quantity.
	<i>Tons.</i>
1888.....	1,942
1889.....	704
1890.....	21,810
1891.....	21,987
1892.....	18,751
1893.....	10,640
1895.....	1,394
1896.....	<i>None.</i>
1897.....	<i>None.</i>
1898.....	950
1899.....	13,686

Mr. Eduardo J. Chibas, C. E., in a report dated 1899, on the Ponupo manganese mines, states that the mines of this group, the Vencedora, Sultana, Balcanee, Inca, Generala, and Mascota, are located at the terminal of the Ponupo branch of the Sabanilla and Maroto Railroad, both the railroad and the mines being controlled by the Ponupo Mining and Transportation Company. The main line of the Sabanilla and Maroto Railroad extends from Santiago de Cuba through Cristo to San Luis, in the province of Santiago de Cuba, a distance of 20½ miles.

Just above Cristo station (11½ miles from Santiago) a branch goes to Ponupo, making the total distance from the mines to Santiago 22½ miles.

The Ponupo manganese deposits are located on the tops and flanks of small hills that branch out from the Sierra Maestra range of mountains, the hill on which the Vencedora deposit is located rising 240 feet above its foot, around part of which flows the Ponupo River.

The rocks in the neighborhood of the deposit are much decomposed, with the exception of some boulders of porphyry and the jasper which comes associated with the ore, and this and the thick vegetation make it difficult to determine the exact geological formation.

At the Ponupo mines it is probable that the manganese may have been derived from one of the igneous rocks, where it is often present in the form of silicate. This was chemically decomposed when the rocks began to disintegrate by the action of atmospheric agencies, and the manganese was carried in solution in the surface waters, and when aided by favorable conditions was deposited in the form of oxide. The deposition of the ore was governed by local conditions, and consequently the extent and continuity of the deposits have to be investigated in each particular case.

The ore is found in pockets of greater or less extent, embedded in clay, resulting from the decomposition of the original inclosing rock. This clay in places assumes various shades of color—red, white, and yellow—due to the different stages of oxidation of the iron and manganese it contains. The ore is also found associated with red or yellow jasper.

The Vencedora claim is the only one worked and all the ore shipped has come from four open cuts. The portion developed in cut No. 1 presents a face 7 feet high and about 200 feet long. It rests on clay and is capped by 3 to 5 feet of soil and jasper. The ore is easily mined with pick and shovel, no blasting being required. The pocket of ore does not lie horizontally, but follows more or less the rise and fall of the ground. The ore is generally of uniform quality and does not require washing. Most of the ore shipped was mined in this cut.

Cut No. 2 is 80 feet long, 15 feet wide at the bottom, and 18 feet deep at the deepest portion. On the eastern wall and along the whole length of the cut is a 5-foot layer of wash ore resting on clay. The western wall shows no marketable ore; it is composed of clay, rock, and highly silicious ore. The south end of the cut presents a face 18 feet high, which is the whole depth of the cut, and about 10 feet wide. The capping covering the ore around this cut consists of a few inches of soil.

The southern wall of cut No. 3 shows wash ore near the surface and for a depth varying from 3 to 5 feet. On the western wall is a capping of about 3 feet of clay and dirt and 5 feet of manganese ore of light weight. In this cut some boulders of porphyry are found.

Cut No. 4 is about 50 feet wide by 75 feet long, showing good ore at the bottom. The southern portion of the cut has been stripped for 40 feet and shows wash ore 5 feet deep. A little farther south of the stripping there is a pit showing good, heavy ore. About 100 feet farther in the same direction is another pit showing only jasper, and marking the southern end of the pocket. Some boulders of porphyry are found in this pocket.

Fifty-one test pits were sunk in order to determine the nature and character of the deposit, and of these 34 struck ore and 17 clay or jasper, or both.

Most of the ore is pyrolusite, but there are four or more distinct varieties. Class No. 1, like that found in cut No. 1, is of good uniform variety and yields, with little or no sorting, 47 and 48 per cent of metallic manganese. Class No. 2 is the black or steel-gray ore, which looks good but is light in weight. Class No. 3 is the ore mixed with clay or soil, and requires washing; and class No. 4 is so high in silica that it can be easily picked out by inspection as an unmarketable ore.

As there is no laboratory at the mines the quality of the ore is judged by inspection, and in a new cut it is difficult to tell the percentages of impurities or of metallic manganese in the ore.

There is no question that the deposit is extensive, and it is well to remember that the workings at Vencedora have been confined thus far to the pockets of ore near the surface, resting on the clay; but this bottom clay has not been pierced to any great depth to determine whether it lies directly on the underlying rock or whether ore bodies intervene. The Ponupo formation seemed to be more regular and uniform than the formation at Nombre de Dios, Colombia, when the same amount of development had been performed.

A log washer has been erected which has a capacity of 30 tons per day of ten hours. It is operated by mules, water being pumped from the Ponupo River 240 feet to a tank on the top of the hill, where it descends by gravity to the washer. The pump is too small and cannot supply sufficient water, and the washer is run only on half time.

The ore is transported from the open cuts to the railroad cars on wheelbarrows. All the mining operations so far have been confined to the portion above the track which is inclosed in the area surrounded by the railroad loop. The ore on the hillside below the level of the railroad can be easily handled by the use of an incline. It is said that two new 35-ton log washers are to be provided to be run by steam.

Little blasting is required in the ore itself, but explosives are used to break up the rocks covering the pockets of ore.

Before the construction of the Ponupo Branch Railroad several thousand tons of manganese ore were mined and carried from Ponupo to Cristo on mule back. From the latter part of November, 1898, until the 1st of April, 1899, about 6,000 tons of ore were mined and shipped.

The number of men employed is about 80, the wages being 75 cents a day. The cost of mining the ore is estimated at \$1.50 to \$2 per ton, and the royalty is 85 cents per ton.

Freight from Ponupo to Santiago is \$1.60 per ton. When the vessel which is to transport the ore is in port the cars are run alongside the boat and the ore is carried into the hold in buckets. When the vessel is not in port, the ore is piled on the ground in Santiago, and on the arrival of the ship is again loaded and taken alongside.

The Sultana mine is located east of the Vencedora. Ten test pits, most of which show good ore, have been sunk, but no working is carried on. The eastern bank of the Ponupo River is very steep and towers about 100 feet above the river, showing along its face here and there for about 200 feet outcrops of manganese ore, some of which are of good quality.

SOUTH AMERICA.

BRAZIL.

The manganese deposits of Bahia and Minas, Brazil, are described by Prof. John C. Branner, Stanford University, California, in the Transactions of the American Institute of Mining Engineers, 1899, from which the following excerpts have been taken:

Thus far the manganese ore shipped from the State of Bahia has come from two mines, the principal one of which is known as the Pedras Pretas mine. This was the first mine opened, is the best developed, and was the original discovery, the second is on an adjoining tract, and the general geology and natural conditions are about the same in both.

The Pedras Pretas mine, on the railway, 26 kilometers west of the town of Nazareth, at the head of navigation, is reached from the city of Bahia by a small steamer that runs across the bay of Bahia and up the Rio Jaguaripe.

The geology of the deposit is of special interest. The rocks are decomposed crystalline schists. Mr. Nack¹ speaks of them as decomposed gneiss, and the rocks have a certain semblance to gneiss.

The city of Bahia stands upon crystalline schists cut by eruptive dikes. Immediately west of the city is a Cretaceous basin that rests unconformably upon these crystalline rocks and extends westward to within a couple of kilometers of the town of Nazareth. At Nazareth the schists are so decomposed that solid rocks in place are to be seen only in the stream beds and here and there in the hills. It is in these decomposed rocks that the manganese is found.

The Brazilian manganese beds are in rocks of approximately the same geologic age and certainly of the same general appearance and characteristics as the great iron-bearing series of the northwestern United States. The mine is 198 meters above tide level and 70 meters above the track of the Amargosa Railway, near by. The ore is psilomelane, and, compared with the Arkansas and Georgia ores, it appeared to be unusually clean, though all of it is somewhat stained with red clay. Some of the lumps are botryoidal in form, but most of them are angular, and many of them are more than 2 feet in diameter. Lumps have been found that weigh 1½ tons. The smallest pieces on the ore piles are larger than one's fist, and these pieces make but a small part of the ore on the heaps.

¹ Chief owner of the Pedras Pretas property.

The Pedras Pretas mine is in soft earth save where large masses of solid ore have been drifted into. Most of the ore thus far shipped has come from the great horizontal sheet that spreads out almost or quite on the surface of the ground.

It seems evident that there is a sheet, bed, or vein of ore standing at an angle of 60° and varying in thickness from a few decimeters to 10 meters. The surface deposits are taken to be the accumulation from the breaking up and weathering out of the bed and the removal of the clays about it, just as the Arkansas ores come from the decomposition of limestones.

For removing clay a pit is covered with railroad iron, the rails lying close against each other and sloping towards the shed. A fire is kept beneath these rails, and all the ore that comes from the pits covered with clay is dumped upon these hot bars and left there until the clay dries. It is then raked off, the clay is removed by rapping the ore lumps with hammers, and the ore is then dropped on the chutes. This ore cleaning is done by women. When the ore comes from the mines clean, the cars are dumped immediately into the chute.

The company owns a tramway over which its ore is hauled to the railway by which it is taken to the wharf at Nazareth. At this place it is loaded on small sailing vessels and sent to Itaparica, a small town on the bay of Bahia, where it is put on board sailing vessels for Europe or the United States.

The Government charges are a little more than 1 milreis a ton on the exported ore. It is stated that sailing vessels charge 10s. a ton to carry the ore from Bahia to Philadelphia. As reported by the mine owners, the total cost (to them) of this manganese ore, laid down in Philadelphia, is \$4.95 a ton.

The Minas Geraes manganese deposits are near the Miguel Burnier station on the Ouro Preto branch of the Central Railway (496 kilometers north of Rio) and at Queluz on the main line (463 kilometers from Rio). They are all open cuts in rocks decomposed in place. The general geology of the region is very much like that of the Bahia manganese mines.

Dr. Antonio Olyntho dos Santos Pires has furnished the following information regarding the Minas manganese deposits:

In the zone between Miguel Burnier and Itabira, on the Central Brazil Railway, two iron furnaces had been started alongside of iron deposits, but the difficulty of getting charcoal for fuel caused the directors of one of these furnaces to turn attention to the manganese and to attempt its exportation. The result of this attempt was favorable, and from this began the regular mining and shipping of this mineral. At present there are three companies engaged in this work, besides the small organizations that are formed and disappear from time to time. These companies operate in the zone between Lafayette and Burnier stations, along the branch railway running from Burnier to Ouro Preto, and lately in the vicinity of the last-named city. It is only within the last two years that these mining operations have become systematized. Of the geology of these deposits no careful studies have been made. The order of the beds, as shown in most of the cuts along the Ouro Preto branch of the railway, is about as follows:

1. Limestone.
2. Ferruginous quartzite, or itabirite.
3. Clays.
4. Compact itabirite.
5. Manganese.
6. Jacutinga, or friable itabirite.
7. Clays.
8. Stratified crystalline rocks, with limonite and impure manganese oxides.
9. Clay shales.
10. Canga, or ferruginous conglomerate.

The kinds of manganese most frequently found are manganite ($\text{Mn}_2\text{O}_3\cdot\text{H}_2\text{O}$) and pyrolusite (MnO_2) and less frequently the other oxides. The itabirite with which the manganese is generally interbedded is composed of hematite and layers of quartz. It is sometimes so compact that it is called ironstone; and again it is friable, when it is known as jacutinga.

The exportation of manganese from the State of Minas began (by way of Rio de Janeiro), upon a small scale, in 1894. In subsequent years it was as follows:

Exports of manganese from Minas, via Rio de Janeiro.

Year.	Metric tons.
1895.....	6,765
1896.....	13,020
1897.....	17,967
1898.....	29,630
1899 (to September).....	a 60,107

a Macqueen gives the exports from Brazil in 1899 as 62,178 tons.

There has also been some manganese exported from Lafayette station and from Ouro Preto, but the export became regular only during the year 1899. To the figures given above there should, therefore, be added at least 15 or 20 per cent, to show the total export of manganese from the State of Minas.

Other districts, such as that of Sabará and Bello Horizonte, along the line of the Central railway, contain deposits of importance which must be developed shortly.

Analyses of manganese ore furnished by Dr. Antonio Olyntho show metallic manganese ranging from 29.8 per cent to 62 per cent; phosphorus ranging from trace to 0.154 per cent.

A statement furnished by Ledoux & Co., of New York City, gave the average analysis of 40,000 tons of Brazilian manganese ore, as follows:

Average analysis of Brazilian manganese ore.

	Per cent.
Moisture	7.60
Manganese	54.08
Phosphorus.....	.03
Silica.....	1.05
Iron.....	.90

COLOMBIA.

The manganese deposits which are at present worked are on the isthmus of Panama, about 45 miles northeast of Aspinwall, near the shore of the Caribbean Sea.

MINERAL RESOURCES.

The mines of this district have been described in a previous report, and the shipments from there have been as follows:

Shipments of manganese ore from the United States of Colombia.

Year.	Shipments.
	<i>Long tons.</i>
To the close of 1896	18, 215
1897	(a)
1898	8, 595
1899	8, 955

a Not reported.

CHILE.

In the report for 1898 a detailed description of the various manganese deposits of Chile were given, together with the analyses of the ores, etc.

It is difficult to obtain exact statistics of the production, the figures of exportation only being procurable. From these it appears that the exports from 1885 to 1899 have been as follows:

Exports of Chilean manganese ores, 1885 to 1899.

Year.	Quantity.	Total value. a	Year.	Quantity.	Total value. a
	<i>Long tons.</i>			<i>Long tons.</i>	
1885.....	4, 041	.....	1893.....	36, 162	\$284, 262
1886.....	23, 928	.....	1894.....	47, 238	371, 374
1887.....	47, 521	.....	1895.....	23, 696	186, 747
1888.....	18, 713	.....	1896.....	25, 740	202, 335
1889.....	28, 683	.....	1897.....	23, 156	.....
1890.....	47, 986	.....	1898.....	20, 522	163, 165
1891.....	34, 462	.....	1899.....	36, 996	.....
1892.....	50, 871	\$399, 881			

a The English pound is taken as \$4.8665.

EUROPE.

GREAT BRITAIN.

The United Kingdom does not produce true manganese ores, but does produce manganiferous iron ores, and Mr. Bennett H. Brough states that the output continues to decline, owing to the competition of richer ores of Russia, India, Chile, and Turkey. The amount produced in the year 1898 was 231 tons, valued at \$974.

The amounts mined and their value, from 1884 to 1898, inclusive, are given in the accompanying table:

Production and value of mangiferous iron ores in the United Kingdom from 1884 to 1898.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	<i>Long tons.</i>			<i>Long tons.</i>	
1884.....	909	\$6,921	1892.....	6,078	\$21,461
1885.....	1,688	11,699	1893.....	1,336	3,688
1886.....	12,763	52,722	1894.....	1,809	3,582
1887.....	13,777	53,772	1895.....	1,273	3,323
1888.....	4,342	9,361	1896.....	1,080	2,983
1889.....	8,852	31,354	1897.....	599	a 1,650
1890.....	12,444	32,588	1898.....	231	974
1891.....	9,476	30,071			

a Estimated.

FRANCE.

M. Alexandre Pourcel, of Paris, supplied the following data in regard to the French manganese mines. In the year 1898 there were nine mines exploited, two of which have not yet reached the productive stage. The greater portion of the ore has been taken from the mines of Las Cabesses (Oriege), which furnished 7,000 tons of calcined carbonate of manganese and 6,400 tons of sorted carbonate ore, and the mines of Romaneche and the Grand Filon (Saône-et-Loire), from which about 7,200 tons of bioxide of manganese were taken.

The amount and value of manganese ores produced in France from 1886 to 1898, inclusive, appear in the following table:

Production and value of manganese ores in France from 1886 to 1898.

Year.	Production.	Total value.	Value per ton.	Year.	Production.	Total value.	Value per ton.
	<i>Long tons.</i>				<i>Long tons.</i>		
1886..	7,555	\$53,099	\$7.03	1893...	37,406	\$290,073	\$7.75
1887..	11,932	50,501	4.23	1894...	32,239	192,264	5.96
1888..	10,873	60,757	5.59	1895...	30,385	177,698	5.85
1889..	9,842	59,000	5.99	1896...	30,797	179,297	5.82
1890..	15,731	89,517	5.69	1897...	36,612	200,720	5.48
1891..	15,101	90,316	5.98	1898...	31,396	160,383	5.11
1892..	31,894	205,074	6.43				

BELGIUM.

Belgium does not mine manganese ores, but produces some manganiferous iron ore. Mr. P. Trasenter states that in 1898 16,440 metric tons of this class of ore were won, valued at 211,500 francs (\$40,820).

The production of manganiferous iron ore from 1880 to 1898, inclusive, and the value of the ore are as follows:

Production of manganiferous iron ores in Belgium from 1880 to 1898.

Year.	Product.	Value.	Year.	Product.	Value.
	<i>Metric tons</i>	<i>Francs.</i>		<i>Metric tons.</i>	<i>Francs.</i>
1880.....	700	4,000	1890.....	14,255	176,000
1881.....	770	4,000	1891.....	18,498	254,600
1882.....	345	1,750	1892.....	16,775	208,300
1883.....	820	4,100	1893.....	16,800	201,000
1884.....	750	3,750	1894.....	22,048	277,700
1885.....			1895.....	22,478	286,270
1886.....	750	9,000	1896.....	23,265	345,020
1887.....	12,750	155,850	1897.....	28,372	342,700
1888.....	27,787	325,000	1898.....	16,440	211,500
1889.....	20,905	248,000			

GERMANY.

The German Empire mines some manganese ores, but they are probably like those of Belgium, more truly manganiferous iron ores, as will be seen by the price, which amounts to but about \$2 per ton.

The production of these ores from 1890 to 1898 is given in the following table:

Production of manganese ores in Germany from 1890 to 1898.

Year.	Quantity.
	<i>Long tons.</i>
1890.....	41,180
1891.....	39,698
1892.....	32,341
1893.....	40,057
1894.....	43,012
1895.....	40,674
1896.....	44,350
1897.....	45,694
1898.....	42,669

The major portion of this ore comes from Prussia, which contributed 41,565 tons out of the total of 42,669 tons.

The amount and value of the ores mined in Prussia from 1881 to 1898 is given in the following table:

Production and value of manganese ores in Prussia from 1881 to 1898.

Year.	Product.	Value.	Year.	Product.	Value.
	<i>Long tons.</i>			<i>Long tons.</i>	
1881.....	10,911	\$79,104	1890.....	39,497	\$174,428
1882.....	4,597	33,745	1891.....	36,278	174,624
1883.....	4,502	28,423	1892.....	30,892	101,844
1884.....	7,629	43,118	1893.....	38,384	93,506
1885.....	14,464	81,302	1894.....	41,854	94,992
1886.....	24,649	177,066	1895.....	39,266	100,832
1887.....	35,957	228,439	1896.....	42,925	97,469
1888.....	26,877	147,250	1897.....	44,538	98,185
1889.....	43,311	216,381	1898.....	41,565	92,050

ITALY.

The Kingdom of Italy contributes a small amount of manganese ore, and also mangariferous iron ores. The amounts and values of these classes of ores produced each year from 1860 to 1898 are given below:

Production of manganese and mangariferous iron ores in Italy from 1860 to 1898.

Year.	Manganese ores.		Mangariferous iron ores.	
	Production.	Value.	Production.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
1860.....	642	\$12,373		
1861.....	515	9,174		
1862.....	1,714	15,661		
1863.....	714	6,674		
1864.....	712	8,567		
1865.....	571	6,716		
1866.....	711	7,191		
1867.....	677	8,079		
1868.....	661	7,894		
1869.....	758	10,403		
1870.....	630	8,646		
1871.....	779	9,793		
1872.....	1,125	12,311		
1873.....	3,103	46,548		

Production of manganese and manganiferous iron ores in Italy from 1860 to 1898—Cont'd.

Year.	Manganese ores.		Manganiferous iron ores.	
	Production.	Value.	Production.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
1874.....	3, 169	\$58, 697	3, 445	\$6, 755
1875.....	3, 750	64, 341	19, 684	96, 500
1876.....	6, 800	61, 074	22, 878	93, 315
1877.....	6, 704	56, 546	7, 874	26, 248
1878.....	6, 550	46, 567	6, 368	15, 297
1879.....	5, 614	33, 842	1, 366	2, 679
1880.....	6, 373	40, 682	20, 148	63, 214
1881.....	8, 629	45, 219	<i>a</i> 29, 526	<i>a</i> 92, 640
1882.....	6, 868	67, 201	<i>a</i> 29, 526	<i>a</i> 92, 640
1883.....	11, 204	52, 975	<i>a</i> 8, 858	27, 792
1884.....	871	7, 570		
1885.....	1, 774	10, 899		
1886.....	5, 473	30, 943		
1887.....	4, 363	21, 872		
1888.....	3, 573	15, 054		
1889.....	2, 168	9, 998		
1890.....	2, 113	10, 050		
1891.....	2, 391	12, 467		
1892.....	1, 223	8, 067	4, 549	8, 028
1893.....	797	6, 320	8, 666	14, 445
1894.....	748	4, 536	5, 718	8, 971
1895.....	1, 544	13, 634		
1896.....	1, 860	19, 734	9, 842	19, 300
1897.....	1, 608	14, 483	20, 926	32, 829
1898.....	2, 955	18, 052	10, 974	25, 823

a In original, 30,000 metric tons valued at 430,000 lire, possibly an estimate.

SPAIN.

With the exception of a few hundred tons of oxide of manganese obtained in the provinces of Oveido and Tereul, all the manganese ores mined in Spain are of the carbonate and silicate varieties, obtained in the province of Huelva.

Mr. Carlos Sundheim, M. E., has supplied statistics in regard to the manganese ore mined in Spain in the year ending December 31, 1899, together with the countries to which it was exported.

MANGANESE ORES.

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Exports of Huelva manganese ores in 1899.

Country.	Quantity.
	<i>Metric tons.</i>
Belgium and Luxemburg.....	127,743
England.....	4,842
France.....	4,449
Germany.....	1,385
Total.....	138,419

The production of manganese ores in Spain from 1890 to 1899, inclusive, is as follows:

Production of manganese ores in Spain from 1890 to 1899.

Year.	Quantity.	Year.	Quantity.
	<i>Long tons.</i>		<i>Long tons.</i>
1890.....	9,716	1895.....	26,946
1891.....	6,883	1896.....	90,546
1892.....	16,643	1897.....	101,937
1893.....	1,437	1898.....	136,182
1894.....	423	1899.....	136,533

AUSTRIA-HUNGARY.

This empire mines each year a small amount of manganese ore. The following tables show the amount produced in Austria from 1876 to 1898, also in late years in Hungary and Bosnia and Herzegovina:

Production of manganese ore in Austria from 1876 to 1895.

Year.	Product.	Year.	Product.
	<i>Centners.</i>		<i>Centners.</i>
1876.....	67,817	1888.....	65,541
1877.....	78,999	1889.....	39,261
1878.....	41,836	1890.....	80,068
1879.....	34,337	1891.....	52,793
1880.....	88,744	1892.....	46,000
1881.....	91,097	1893.....	54,000
1882.....	84,183	1894.....	101,120
1883.....	93,821	1895.....	a 92,270
1884.....	79,423		<i>Metric tons.</i>
1885.....	61,577	1897.....	6,012
1886.....	92,464	1898.....	6,123
1887.....	93,108		

a Including Bosnia.

MINERAL RESOURCES.

Production of manganese ore in Hungary. (a)

Year.	Metric tons.
1897.....	3, 976
1898.....	8, 055

a Ungarisches Statistisches Jahrbuch.

Production of manganese ore in Bosnia and Herzegovina.

Year.	Quantity.
	<i>Long tons.</i>
1892.....	7, 819
1895.....	8, 016
1896.....	6, 713
1897.....	a 5, 260
1898.....	a 5, 235

a Bosnisches Bureau Montan Abtheilung.

SWEDEN.

Sweden has been a continuous producer of small amounts of manganese ore, Dr. Richard Akerman, of Stockholm, reporting that in the year 1898 2,358 metric tons, valued at 41,270 crowns, were won.

The production from 1888 to 1898, inclusive, is as follows:

Production of manganese ores in Sweden, 1888 to 1898.

Year.	Product.	Value.
	<i>Long tons.</i>	
1888.....	9, 537	
1889.....	8, 509	
1890.....	10, 529	
1891.....	8, 936	
1892.....	7, 708	
1893.....	6, 949	
1894.....	3, 306	
1895.....	3, 068	
1896.....	2, 023	\$7, 197
1897.....	2, 706	12, 616
1898.....	2, 321	11, 060

RUSSIAN EMPIRE.

Probably the richest and at present the most extensively exploited manganese deposits in the world are found in the trans-Caucasian district of Russia, and the major portion of the product is exported to various foreign countries. Macqueen gives the total exports of manganese ore in the year 1899, from the Caucasus district, as 348,162 tons, and from South Russia 28,283 tons, a total export of 376,445 metric tons (370,499 long tons).

The table below gives the production and exports of Caucasian manganese ore from 1885 to 1899, together with the distribution of exports from 1893 to 1897, inclusive:

Production and exports of Caucasian manganese ore.

Year.	Production.	Exports.	Year.	Production.	Exports.
	<i>Long tons.</i>	<i>Long tons.</i>		<i>Long tons.</i>	<i>Long tons.</i>
1885.....	58,722	41,396	1893.....	166,420	126,630
1886.....	67,985	53,751	1894.....	180,533	157,275
1887.....	51,890	59,523	1895.....	160,277	185,718
1888.....	29,401	49,076	1896.....		166,224
1889.....	68,439	55,489	1897.....	231,868	210,106
1890.....	168,840	135,492	1898.....		277,857
1891.....	98,670	84,040	1899.....		370,499
1892.....	165,101	129,835			

Distribution of exports of Caucasian manganese ore.

Country to which exported.	1893.	1894.	1895.	1896.	1897.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Great Britain	42,930	65,110	60,616	77,754	68,650
France	4,100		150	5,650	
Russia.....		9,890	9,600	20,175	28,446
Belgium.....	3,125	2,520		220	
Germany	40,405	51,455	59,565	58,825	70,810
United States	36,070	28,300	55,787	3,600	42,200
Total exports ...	126,630	157,275	185,718	166,224	210,106

TURKEY.

Turkey has deposits of manganese ore, but no official statistics of the amount mined are obtainable. Macqueen gives the total exports from the Kassandra district in 1899 as 38,305 tons.

PORTUGAL.

Portugal has a few manganese beds, which are worked in a spasmodic way, the exports in 1899, as given by Macqueen, being 4,130 tons. In 1897, 1,652 metric tons were mined, and in 1898, 907 metric tons.

GREECE.

Greece has both manganese ores and manganiferous iron ores, the exports of the former variety being reported as 15,300 tons in 1899, as against 14,097 metric tons in 1898 and 11,710 metric tons in 1897.

INDIA.

India, particularly in 1899, exported considerable manganese ore, the most of which has come from the Madras Presidency. Mr. Herbert K. Scott states that the ore is high in phosphorus. Macqueen gives the exports from India in 1899 as 77,348 tons.

The exports from 1892 to 1899 are as follows:

Exports of manganese ore from British India by sea to other countries, from 1892 to 1899.

Year.	Number of tons.
1892-93.....	1,000
1893-94.....	1,650
1894-95.....	6,416
1895-96.....	22,758
1896.....	56,869
1897.....	73,680
1898.....	(a)
1899.....	77,348

a Not reported.

JAPAN.

The manganese deposits of Japan are said by Mr. Scott to be of small extent and hence not likely to become a prominent source of supply.

The production and exports from 1881 to 1899 are as follows:

Production and exports of manganese ores in Japan from 1881 to 1899. (a)

Year.	Product.	Total value.	Year.	Product.	Total value.
	<i>Long tons.</i>			<i>Long tons.</i>	
1881.....	2	.....	1891.....	3, 178	.....
1882.....	156	.....	1892.....	4, 948	.....
1883.....	151	.....	1893.....	18, 510	\$106, 016
1884.....	125	.....	1894.....	17, 465	99, 007
1885.....	123	.....	1895.....	16, 338	97, 906
1886.....	404	.....	1896.....	20, 785	136, 668
1887.....	312	.....	1897.....	14, 524	102, 248
1888.....	813	.....	1898.....	9, 905	77, 853
1889.....	945	.....	1899.....	6, 370	.....
1890.....	2, 604	.....		

a Reports Department Finance, Empire of Japan.

b Reported by Macqueen.

JAVA.

This island exported in 1899 about 910 tons of manganese ore, all of which went to European ports. This ore is produced in the regencies of Pengasih and Nanggoelan. In 1896, 3,000 tons were exported, and 5,200 tons in 1897.

NEW ZEALAND.

New Zealand produces small amounts of manganese ore, furnishing 180 long tons in 1897 and 217 tons in 1898.

WORLD'S PRODUCTION OF MANGANESE ORE.

The following table gives the production of manganese ores in various countries in the latest years for which statistics were available, those which exported ores to the United States being marked (a).

World's production of manganese ores.

Country.	Year.	Product.
North America:		<i>Tons.</i>
United States	1899	9, 935
Canada <i>a</i>	1899	1, 581
Cuba <i>a</i>	1899	<i>b</i> 13, 686
Newfoundland	1897	1, 500
South America:		
Brazil <i>a</i>	1899	<i>b</i> 62, 178
Chile <i>a</i>	1899	<i>b</i> 36, 996
Colombia <i>a</i>	1899	<i>b</i> 8, 955
Europe:		
Austria	1898	6, 132
Bosnia and Herzegovina	1898	5, 235
Hungary	1898	8, 055
France <i>a</i>	1898	31, 396
Germany <i>a</i>	1898	42, 669
Greece <i>a</i>	1899	<i>b</i> 15, 300
Italy	1898	2, 955
Portugal	1899	<i>b</i> 4, 130
Russia <i>a</i>	1899	<i>b</i> 376, 445
Spain	1899	<i>b</i> 136, 533
Sweden	1898	2, 321
Turkey <i>a</i>	1899	<i>b</i> 38, 305
Asia:		
India <i>a</i>	1899	<i>b</i> 77, 348
Japan <i>a</i>	1899	<i>b</i> 6, 370
Java	1899	<i>b</i> 910
Oceania:		
New South Wales	1898	1
New Zealand	1898	217
Queensland	1898	67

a Countries so marked contributed to the manganese supply of the United States in 1899.

b Exports.

COPPER.

By CHARLES KIRCHHOFF.

GENERAL TRADE CONDITIONS.

The year 1899 will go down in the annals of the copper industry as one of the most exceptional in its history. It was a year of extraordinary speculation in copper stocks, of profits due to high prices justified by an unprecedented consumption the world over. It is safe to say that not a single one of the older properties which had been in full normal operation closed the year without handsome returns to its stockholders. Under the stimulus of such a record, capital was easily induced to undertake new ventures, yet so extensive are the preparations needed to reach the productive stage that as yet few new concerns have become regular contributors to the country's supply of metal. Nor have the steps taken to increase the output of the old mines yet led to any marked expansion. It must not be inferred, however, from the fact that additions to production can not be made at short notice, that they will not ultimately make themselves felt.

PRODUCTION.

The following table shows the production of copper in the United States since its rise to the dignity of an industry. For the earlier years the best available sources have been drawn upon for the estimates given. Since 1882 the figures are those collected by this office:

Production of copper in the United States from 1845 to 1899.

[Long tons.]

Year.	Total production.	Lake Superior.	Percentage of Lake Superior of total product.
1845.....	100	12	12
1846.....	150	26	17.3
1847.....	300	213	71
1848.....	500	461	92.2
1849.....	700	672	96
1850.....	650	572	88

MINERAL RESOURCES.

Production of copper in the United States from 1845 to 1899—Continued.

[Long tons.]

Years.	Total production.	Lake Superior.	Percentage of Lake Superior of total product.
1851.....	900	779	86.6
1852.....	1,100	792	72
1853.....	2,000	1,297	64.9
1854.....	2,250	1,819	80.8
1855.....	3,000	2,593	86.4
1856.....	4,000	3,666	91.7
1857.....	4,800	4,255	88.6
1858.....	5,500	4,088	74.3
1859.....	6,300	3,985	63.3
1860.....	7,200	5,388	74.8
1861.....	7,500	6,713	89.5
1862.....	9,000	6,065	67.4
1863.....	8,500	5,797	68.2
1864.....	8,000	5,576	69.7
1865.....	8,500	6,410	75.4
1866.....	8,900	6,138	69
1867.....	10,000	7,824	78.2
1868.....	11,600	9,346	80.6
1869.....	12,500	11,886	95.1
1870.....	12,600	10,992	87.2
1871.....	13,000	11,942	91.9
1872.....	12,500	10,961	87.7
1873.....	15,500	13,433	86.7
1874.....	17,500	15,327	87.6
1875.....	18,000	16,089	89.4
1876.....	19,000	17,085	89.9
1877.....	21,000	17,422	83
1878.....	21,500	17,719	82.4
1879.....	23,000	19,129	83.2
1880.....	27,000	22,204	82.2

COPPER.

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Production of copper in the United States from 1845 to 1899—Continued.

[Long tons.]

Year.	Total production, United States.	Lake Superior.	Percentage of Lake Superior of total product.	Montana.	Percentage of Montana of total product.	Arizona.	Percentage of Arizona of total product.
1881.....	32,000	24,363	76.1	-----	-----	-----	-----
1882.....	40,487	25,439	62.9	-----	-----	-----	-----
1883.....	51,574	26,653	51.6	11,011	21.3	10,658	20.7
1884.....	64,708	30,961	47.8	19,256	29.8	11,935	18.4
1885.....	74,052	32,209	43.5	30,267	40.9	10,137	13.7
1886.....	70,430	36,124	51.3	25,362	36	6,990	9.9
1887.....	81,017	33,941	41.9	35,133	43.4	7,910	9.7
1888.....	101,054	38,604	38.2	43,704	43.2	14,195	14
1889.....	101,239	39,364	38.7	43,849	43.3	13,654	13.5
1890.....	115,966	45,273	38.9	50,437	43.5	15,534	13.4
1891.....	126,839	50,992	40.2	50,028	39.5	17,800	14
1892.....	154,018	54,999	35.7	72,860	47.3	17,160	11.1
1893.....	147,033	50,270	34.2	69,290	47.1	19,200	13.1
1894.....	158,120	51,031	32.3	81,729	51.6	19,873	12.6
1895.....	169,917	57,737	34	84,900	50	21,408	12.6
1896.....	205,384	64,073	31.2	99,071	48.2	32,560	15.8
1897.....	220,571	64,858	29.4	102,807	46.6	36,398	16.5
1898.....	235,050	66,291	28.2	92,041	39.2	49,624	21.1
1899.....	253,870	65,803	25.9	100,503	39.6	59,399	23.4

In detail, the production of copper, territorially distributed, has been as follows since 1883:

Total copper production in the United States, 1883 to 1887.

Source.	1883.	1884.	1885.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Lake Superior	59, 702, 404	69, 353, 202	72, 147, 889
Arizona	23, 874, 963	26, 734, 345	22, 706, 366
Montana	24, 664, 346	43, 093, 054	67, 797, 864
New Mexico	823, 511	59, 450	79, 839
California	1, 600, 862	876, 166	469, 028
Utah	341, 885	265, 526	126, 199
Colorado	1, 152, 652	2, 013, 125	1, 146, 460
Wyoming	962, 468		
Nevada	288, 077	100, 000	8, 871
Idaho		46, 667	40, 381
Missouri	260, 306	230, 000	
Maine and New Hampshire ..	212, 124	249, 018	} 211, 602
Vermont	400, 000	655, 405	
Southern States	395, 175	317, 711	40, 199
Middle States	64, 400	2, 114	180, 641
Lead desilverizers, etc	782, 880	950, 870	910, 144
Total domestic copper .	115, 526, 053	144, 946, 653	165, 875, 483
From imported pyrites and ores	1, 625, 742	2, 858, 754	5, 086, 841
Total (including copper from imported pyrites)	117, 151, 795	147, 805, 407	170, 962, 324

Total copper production in the United States, 1883 to 1887—Continued.

Source.	1886.	1887.
	<i>Pounds.</i>	<i>Pounds.</i>
Lake Superior	80,918,460	76,028,697
Arizona.....	15,657,035	17,720,462
Montana.....	57,611,621	78,699,677
New Mexico	558,385	283,664
California.....	430,210	1,600,000
Utah	500,000	2,500,000
Colorado.....	409,306	2,012,027
Wyoming.....		
Nevada	50,000	
Idaho.....		
Missouri		
Maine and New Hampshire	315,719	200,000
Vermont.....		
Southern States	29,811	
Middle States		
Lead desilverizers, etc.....	1,282,496	2,432,804
Total domestic copper.....	157,763,043	181,477,331
From imported pyrites and ores	4,500,000	3,750,000
Total (including copper from imported pyrites).....	162,263,043	185,227,331

Since 1888 the production has been as follows, in detail:

Total copper production in the United States, 1888 to 1899.

Source.	1888.	1889.	1890.	1891.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Lake Superior	86,472,034	88,175,675	101,410,277	114,222,709
Arizona	31,797,300	31,586,185	34,796,689	39,873,279
Montana	97,897,968	98,222,444	112,980,896	112,063,320
New Mexico	1,631,271	3,686,137	850,034	1,233,197
California	1,570,021	151,505	23,347	3,397,405
Utah	2,131,047	65,467	1,006,636	1,562,098
Colorado, including copper smelters a..	1,621,100	1,170,053	3,585,691	6,336,878
Wyoming	232,819	100,000	.....	.....
Nevada	50,000	26,420	.....	.....
Idaho	50,000	156,490	87,243	146,825
Washington .....	.....	.....	.....	.....
Maine and New Hampshire	271,631	72,000	378,840	296,463
Vermont				
Southern States	18,201	18,144		
Middle States .....	.....	.....	.....	.....
Lead desilverizers, etc	2,618,074	3,345,442	4,643,439	4,989,590
Total domes- tic copper...	226,361,466	226,775,962	259,763,092	284,121,764
From imported py- rites and ores	4,909,156	5,190,252	6,017,041	11,690,312
Total (includ- ing copper from im- ported py- rites)	231,270,622	231,966,214	265,780,133	295,812,076

a Copper smelters in Colorado, purchasing argentiferous copper ores and mattes in the open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.

COPPER.

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Total copper production in the United States, 1888 to 1899 —Continued.

Source.	1892.	1893.	1894.	1895.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Lake Superior	123, 198, 460	112, 605, 078	114, 308, 870	129, 330, 749
Arizona	38, 436, 099	43, 902, 824	44, 514, 894	47, 953, 553
Montana	163, 206, 128	155, 209, 133	183, 072, 756	190, 172, 150
New Mexico	1, 188, 796	280, 742	31, 884	143, 719
California	2, 980, 944	239, 682	120, 000	218, 332
Utah	2, 209, 428	1, 135, 330	1, 147, 570	2, 184, 708
Colorado, including copper smelters <i>a</i> ..	7, 593, 674	7, 695, 826	6, 481, 413	6, 079, 243
Wyoming				
Nevada		20, 000		
Idaho	226, 000	36, 367		1, 425, 914
Washington		39, 785		
Maine and New Hampshire	467, 448	732, 793	2, 374, 514	3, 105, 036
Vermont				
Southern States				
Middle States				
Lead desilverizers, etc. <i>b</i>	5, 491, 702	7, 456, 838	2, 136, 473	
Total domes- tic copper....	344, 998, 679	329, 354, 398	354, 188, 374	380, 613, 404
From imported py- rites and ores and regulus	7, 973, 065	10, 431, 574	10, 678, 434	<i>c</i> 5, 300, 000
Total (includ- ing copper from im- ported py- rites)	352, 971, 744	339, 785, 972	364, 866, 808	385, 913, 404

a Copper smelters in Colorado, purchasing argentiferous copper ores and mattes in the open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.

b For 1894 the quantity stated covers only that part of the incidental copper product the source of which could not be ascertained.

c Estimated.

MINERAL RESOURCES.

Total copper production in the United States, 1888 to 1899—Continued.

Source.	1896.	1897.	1898.	1899.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Lake Superior	143,524,069	145,282,059	158,491,703	147,400,338
Arizona	72,934,927	81,530,735	111,158,246	133,054,860
Montana	221,918,179	230,288,141	206,173,157	225,126,855
New Mexico	2,701,664	701,892	1,592,371	3,935,441
California	690,237	11,987,772	16,925,634	26,221,897
Utah	3,502,012	3,919,010	3,750,000	9,584,746
Colorado, including copper smelters <i>a</i> ..	6,022,176	11,873,033	16,274,561	11,643,608
Wyoming			233,044	3,104,827
Nevada			437,396	556,775
Idaho		183,277	1,266,920	110,000
South Dakota		2,440,338	1,261,393	17,020
Maine and New Hampshire				
Vermont	4,704,993	4,472,017	5,395,226	4,410,554
Tennessee and South- ern States				
Middle States				
Lead desilverizers, etc. <i>b</i>	4,063,173	1,400,000	3,553,336	3,500,000
Total domestic copper	460,061,430	494,078,274	526,512,987	568,666,921
From imported py- rites and ores and regulus	<i>c</i> 5,900,000	<i>c</i> 12,000,000	<i>c</i> 19,750,000	<i>c</i> 23,800,000
Total (includ- ing copper from im- ported py- rites)	465,961,430	506,078,274	546,262,987	592,466,921

a Copper smelters in Colorado, purchasing argentiferous copper ores and mattes in the open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.

b For 1896 the quantity stated covers only that part of the incidental copper product, the source of which could not be ascertained.

c Estimated.

The available supply for the domestic markets may be computed as follows:

Supply of copper for the United States, 1892 to 1899.

Source.	1892.	1893.	1894.	1895.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Production of domestic copper.....	344,998,679	329,354,398	354,188,374	380,613,404
Imports:				
Fine copper in ore, entered for consumption	7,669,978	7,256,015	4,804,614	a 5,300,000
Fine copper in regulus, entered for consumption	303,087	3,175,559	5,873,820	
Bars and ingots..	22,097	554,348	606,415	7,979,322
Old copper.....	71,485	59,375	160,592	1,336,901
Total	353,065,326	340,399,695	365,633,815	395,229,627
Exports:				
Ingots and bars..	30,515,736	138,984,128	162,393,000	121,328,390
Estimated fine copper contents of matte..	66,000,000	50,000,000	5,750,000	15,200,000
Total	96,515,736	188,984,128	168,143,000	136,528,390
Available supply.....	256,549,590	151,415,567	197,490,815	258,701,337

a Estimated.

Supply of copper for the United States, 1892 to 1899—Continued.

Source.	1896.	1897.	1898.	1899.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Production of domestic copper.....	460,061,430	494,078,274	528,512,987	568,666,921
Imports:				
Fine copper in ore, entered for consumption	a5,900,000	a12,000,000	a19,750,000	23,800,000
Fine copper in regulus, entered for consumption				
Bars and ingots..	9,074,379	16,923,098	50,840,000	71,922,340
Old copper.....	2,422,554			
Total	477,458,363	523,001,372	597,102,987	664,389,261
Exports:				
Ingots and bars..	258,473,285	277,255,742	291,955,905	246,826,331
Estimated fine copper contents of matte.	22,881,936	11,000,000	5,420,000	3,500,000
Total	281,355,221	288,255,742	297,375,905	250,326,331
Available supply.....	196,103,142	234,745,630	299,727,082	414,062,930

a Estimated.

Since July, 1892, Mr. John Stanton, of New York, has collected monthly, from sworn returns, the following figures showing the production of the leading mines of Lake Superior, Montana, and Arizona. The estimate of outside sources is drawn, particularly recently, from official returns of the principal smaller mines.

American product of copper.

[Long tons.]

Year.	Reporting mines.	Outside sources.	Total.
Second six months of 1892	59,239	6,287	65,526
1893.....	129,760	12,730	142,490
1894.....	142,543	17,080	159,623
1895.....	155,497	15,700	171,197
1896.....	189,494	14,400	203,894
1897.....	204,206	11,900	216,106
1898.....	216,222	18,050	234,272
1899.....	230,806	31,400	262,206

The monthly reports, in detail, for the years 1892, 1893, and 1894 are published in Mineral Resources for 1895; for the years 1895 and 1896 in Mineral Resources for 1896; and for 1897 and 1898 in Mineral Resources for 1898. For 1898, 1899, and the first nine months of 1900 the monthly production was as follows:

American product of copper, monthly, 1898, 1899, and the first nine months of 1900.

[Long tons.]

Year and month.	Reporting mines.	Outside sources.	Total.
1898.			
January	16,544	1,200	17,744
February	16,072	1,250	17,322
March	19,131	1,250	20,381
April	21,609	1,300	22,909
May	21,391	1,350	22,741
June	17,940	1,450	19,390
July	14,452	1,600	16,052
August	17,908	1,600	19,508
September	17,064	1,700	18,764
October	19,429	1,700	21,129
November	18,050	1,800	19,850
December	16,632	1,850	18,482
Total	216,222	18,050	234,272
1899.			
January	16,774	1,850	18,624
February	17,899	2,000	19,899
March	19,918	2,000	21,918
April	17,854	2,100	19,954
May	19,832	2,250	22,082
June	19,710	2,300	22,010
July	18,533	2,800	21,333
August	19,886	2,800	22,686
September	19,515	3,200	22,715
October	20,680	3,300	23,980
November	19,817	3,400	23,217
December	20,388	3,400	23,788
Total	230,806	31,400	262,206

MINERAL RESOURCES.

American product of copper, monthly, 1898, 1899, etc.—Continued.

[Long tons.]

Year and month.	Reporting mines.	Outside sources.	Total.
1900.			
January	17, 613	3, 400	21, 013
February	17, 497	3, 400	20, 897
March	19, 883	3, 400	23, 283
April	20, 667	3, 400	24, 067
May	19, 282	3, 400	22, 682
June	19, 235	3, 400	22, 635
July	19, 612	3, 400	23, 012
August	17, 667	3, 400	21, 067
September	17, 986	3, 400	21, 386
Total nine months	169, 442	30, 600	200, 042

A considerable number of foreign mines, including those of the Peninsula, the Cape, Australasia, Germany, and Mexico, report monthly to a secretary in London since July, 1892. During the last six months of 1892, and in 1893, 1894, 1895, 1896, 1897, 1898, 1899, and the first nine months of 1900, the product of this group, which maintains friendly relations with the American Producers' Association, has been as follows:

Foreign reporting mines.

Year.	Quantity.
	<i>Long tons.</i>
Second half 1892.....	39, 655
1893.....	81, 785
1894.....	88, 531
1895.....	86, 178
1896.....	86, 196
1897.....	88, 270
1898.....	84, 554
1899.....	89, 240
1900 (first nine months)	65, 276

According to the careful compilations of Mr. John Stanton, the exports of fine copper during recent years have been as follows:

Exports of fine copper from the United States.

Year.	Quantity.
	<i>Long tons.</i>
1893.....	80,392
1894.....	77,527
1895.....	64,722
1896.....	125,605
1897.....	129,210
1898.....	145,115
1899.....	119,811
1900 (first nine months)	126,669

LAKE SUPERIOR DISTRICT.

The following is, in detail, the output of the Lake Superior mines, as reported by the companies, from 1884 to 1891:

Production of Lake Superior copper mines, 1884 to 1891.

Mine.	1884.	1885.	1886.	1887.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Calumet and Hecla..	40,473,585	47,247,990	50,518,222	46,016,123
Quincy	5,650,436	5,848,530	5,888,511	5,603,691
Osceola	4,247,630	1,945,208	3,560,786	3,574,972
Franklin	3,748,652	4,007,105	4,274,297	3,915,838
Allouez	1,928,174	2,170,476	1,725,463	885,010
Atlantic	3,163,585	3,582,633	3,503,670	3,641,865
Pewabic	227,834			
Central	1,446,747	2,157,408	2,512,886	2,199,133
Grand Portage	255,860			
Conglomerate	1,198,691			
Mass	481,396	363,500	247,179	
Copper Falls.....	891,168	1,150,538	1,378,679	719,150
Phoenix	631,004	344,355	1,101,804	11,000
Hancock	562,636	203,037	150,000	
Huron	1,927,660	2,271,163	1,992,695	1,881,760
Ridge	74,030	63,390	158,272	84,902
St. Clair.....	139,407			
Cliff.....	28,225		22,342	
Wolverine.....	751,763	328,610	3,125	2,300
Nonesuch.....	23,867	28,484		
Isle Royale	16,074			

Production of Lake Superior copper mines, 1884 to 1891—Continued.

Mine.	1884.	1885.	1886.	1887.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
National.....	87,368	162,252	184,706	25,187
Minnesota.....	1,144	12,608		
Belt.....	130,851	27,433	7,300	
Sheldon and Colum- bia.....	9,828			
Adventure.....	4,333	4,000	1,000	
Peninsula.....	1,225,981			
Tamarack.....		181,669	3,646,517	7,396,529
Ogima.....	1,106	12,000		
Kearsarge.....				21,237
Evergreen Bluff.....	954	1,500	1,000	
Ash Bed.....	1,517			
Sundry companies— tributers.....	21,696	34,000	50,000	50,000
Total.....	69,353,202	72,147,889	80,918,460	76,028,697

Mine.	1888.	1889.	1890.	1891.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Calumet and Hecla..	50,295,720	48,668,296	59,868,106	
Quincy.....	6,367,809	6,405,686	8,064,253	10,542,519
Osceola.....	4,134,320	4,534,127	5,294,792	6,543,358
Franklin.....	3,655,751	4,346,062	5,638,112	4,319,840
Allouez.....	314,198	1,762,816	1,407,828	1,241,423
Atlantic.....	3,974,972	3,698,837	3,619,972	3,653,671
Central.....	1,817,023	1,270,592	1,413,391	1,237,500
Mass.....		58,349	62,187	
Copper Falls.....	1,199,950	1,440,000	1,330,000	1,427,000
Huron.....	2,370,857	2,219,473	1,736,777	1,257,059
Ridge.....	50,924	28,000	21,569	
National.....		454,134	123,879	
Adventure.....		692	15,485	
Peninsula.....		736,507	1,108,660	1,599,670
Tamarack.....	11,411,325	10,605,451	10,106,741	16,161,312
Kearsarge.....	829,185	1,918,849	1,598,525	1,727,390
Evergreen Bluff.....		21,580		
Sundry companies— tributers.....	50,000	6,224		
Total.....	86,472,034	88,175,675	101,410,277	

The following table records only the output of some of the leading producers in that district:

Production of some of the leading Lake Superior copper mines, 1892 to 1899.

Mine.	1892.	1893.	1894.	1895.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Tamarack	16,426,633	15,085,113	15,375,281	14,900,286
Quincy	11,103,926	14,398,477	15,484,014	16,304,721
Osceola	7,098,656	6,715,870	6,918,502	6,270,373
Franklin	3,769,605	3,504,244	3,556,487	3,086,933
Atlantic	3,703,875	4,221,933	4,437,609	4,832,497
Kearsarge	1,467,758	1,627,030	1,998,710	1,946,163
Tamarack, Jr	796,769	1,610,259	2,349,329	2,605,000
Peninsula	973,217			
Copper Falls	1,350,000	750,000		
Huron	461,499	562,776		
Allouez	546,530			
Central	1,625,982	1,180,040	584,590	379,020
Centennial	106,801			
Wolverine	500,074	1,025,062	1,665,255	1,815,391
Mine.	1896.	1897.	1898.	1899.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Tamarack	16,044,860	20,222,529	23,000,000	18,565,602
Quincy	16,863,477	16,924,618	16,354,061	14,301,182
Osceola	6,251,304	11,201,103	11,900,000	11,358,049
Kearsarge	1,377,226			
Tamarack, Jr	2,135,000			
Franklin	2,746,076	2,908,284	2,623,702	1,230,000
Atlantic	4,895,985	5,109,663	4,377,399	4,675,882
Central	469,243	611,172	291,339	
Wolverine	2,220,933	2,316,296	4,588,114	4,756,646

Since very elaborate preparations, both underground and on the surface, are necessary to develop new property or increase the production of old mines, the output of the Lake district can not be rushed. It is certain, however, from the work now under way and recently completed, that a considerable increase in output will be gradually attained. There are under construction or recently completed six heads of stamps at the Calumet and Hecla mine, three at the Osceola, three at the Arcadian, three at the Isle Royale, two at the Baltic, four at the Franklin, Jr., and one at the Mass. The Wolverine is expected soon to add to its equipment, and the Mohawk, Trimountain, Adventure, and Michigan are planning to erect crushing plants.

An interesting development in crushing rock in this region has been the improvement in the stamp mills, the Nordberg Manufacturing Company, of Milwaukee, having taken the initiative. Through changes in the design a largely increased screen area has been obtained and the openings in the screens themselves have been enlarged, they being now about five-eighths inch. In this manner the daily crushing capacity has been raised from about 350 tons to 550 tons. The Nordberg Manufacturing Company has also improved the valve gear of the stamp, so as to strike a dead blow and thus secure a more economical use of the steam. In practice it has been found that the steam consumption is not greater with the new than with the old-style stamps, so that the coal consumption is about the same crushing 550 tons per day as it was in the old type handling 350 tons per day.

The annual report of the Calumet and Hecla Mining Company for the fiscal year ending April 30 shows a product of 49,312 tons of refined copper, as compared with 44,450 tons during the previous fiscal year. The most interesting undertaking in progress in connection with this great company is its development of the Osceola amygdaloid belt. Three shafts are being sunk on it and extensive opening is in progress from which a certain amount of rock is obtained which is crushed with one head. The foundations have been laid for a new stamp mill, to contain six heads, which it is expected will treat 2,500 tons of amygdaloid rock per day.

President Agassiz reports that experimental work is going on with washing machines differing from those generally in use in the Lake Superior district, with the aim of diminishing the loss of copper.

Extensive improvements are under way at the Buffalo works of the company. An electrolytic plant is under construction for the purpose of treating ore which carries the larger values in silver. Additional property has been purchased fronting on the Niagara River.

For the year 1899 the production of the Quincy Copper Company was 17,866,680 pounds of mineral, yielding 14,301,182 pounds of refined copper, for which was realized the gross sum of \$2,450,178.66. The running expenses at the mine were \$969,741.09; the construction account amounted to \$404,481.09. The tax in Michigan aggregated \$40,117.06, and the smelting, transportation, and all other expenses \$153,752.08, leaving as a mining profit \$882,087.34. There were realized from interest on loans \$13,361.08, and from Hancock real estate \$33,218.57, making the income for the year \$928,666.99. There were paid in dividends during the year \$950,000, thus reducing the balance of assets to \$1,207,942.14 on January 1, 1900. There were mined 602,409 tons of rock, of which there were hoisted 586,820 tons, and treated in the stamp mill 559,164 tons. The cost of stamping itself was 22.19 cents per ton of rock.

The Quincy Company has been completing a new stamp mill with three heads of stamps. Considerable construction work and additions to machinery were undertaken during the year 1899.

The following table shows the operations of the Quincy mine for a series of years. It will be observed that until recent years the production has increased steadily; that the yield has very considerably fluctuated from year to year, and that the average monthly contract wages have shown a fairly steady increase for a series of years. In the table the average price realized is calculated from the gross income and product, the reports failing to show the quantity of copper on hand at the beginning of each fiscal year.

Operations of the Quincy mine, Lake Superior.

Year.	Product.	Yield fine cop- per per fathom broken.	Price obtained.	Cost per pound, exclusive of con- struction.	Number of miners on con- tract.	Average monthly contract wages.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Cents.</i>	<i>Cents.</i>		
1864.....	2,498,574	562	44.8	26.7	242	\$65.50
1865.....	2,720,980	501			212	57.53
1866.....	2,114,220	451	31.3	29	227	53.16
1867.....	1,921,620	526	22.7	18.9	167	50.83
1868.....	1,417,941	447	25.2	23.1	157	50.44
1869.....	2,417,365	446	21.9	16.7	210	51.10
1870.....	2,496,774	528	21.5	15.3	181	46.09
1871 <i>a</i>	2,409,501	441	22.8	15.2	104	47.08
1872.....	2,269,104	391	32.5	22.9	233	60.62
1873.....	2,621,087	491	26.5	18.6	223	62.42
1874.....	3,050,154	577	21.9	15.1	234	43.38
1875.....	2,798,281	485	22.7	15.8	217	46.74
1876.....	3,073,171	507	20	15.7	227	47.13
1877.....	2,837,014	467	18.6	15.1	247	43.79
1878.....	2,991,050	395	14.9	14	234	41.50
1879.....	2,639,958	403	16.3	13.7	212	38.76
1880.....	3,609,250	563	18.5	11.8	192	49.10
1881.....	5,702,606	767	18.7	10	212	48.54
1882.....	5,682,663	800	17.1	9.5	152	48.83
1883.....	6,012,239	850	13.7	8.9	165	46.02
1884.....	5,680,087	722	12.2	8.6	157	43.35
1885.....	5,848,497	710	11.4	7.5	132	44.00
1886.....	5,888,517	638	11.1	6.8	140	45.80
1887.....	5,603,691	781	11.7	8.6	142	48.40
1888.....	6,367,809	690	15.9	10.1	158	49.60
1889.....	6,405,686	690	12	9.4	145	49.15
1890.....	8,064,253	769	15.7	8.2	146	52.60
1891.....	10,542,519	685	12.8	9.1	182	53.40
1892.....	11,103,926	572	11.27	8.8	238	53.75

a Introduction of steam drills.

Operations of the Quincy mine, Lake Superior—Continued.

Year.	Product.	Yield fine cop- per per fathom broken.	Price obtained.	Cost per pound, exclusive of con- struction.	Number of miners on con- tract.	Average monthly contract wages.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Cents.</i>	<i>Cents.</i>		
1893.....	14,398,477	574	10.4	7.1	259	\$49.60
1894.....	15,484,014	584	9.5	5.7	285	50.70
1895.....	16,304,721	517	10.1	5.9	336	50.00
1896.....	16,863,477	477	10.9	6.5	379	52.00
1897.....	16,924,618	481	11.1	6.8	393	52.52
1898.....	16,354,061	513	12	6.8	381	52.50
1899.....	14,301,182	427	17.1	8.1	401	56.72

The production of the Tamarack Mining Company shows a moderate increase during the year 1899, the production of mineral having been 31,713,752 pounds, as compared with 31,127,623 pounds in 1898 and 29,589,380 pounds in 1897. During the year 775,132 tons of rock ore were mined, and 631,090 tons of rock were stamped at an average cost of 22.727 cents per ton. Included in this were 51,090 tons of rock from the Osceola amygdaloid vein, which is considerably lower in grade than the average of the conglomerate, and therefore carries down the average somewhat. Rapid progress has been made during the year in sinking No. 5 shaft, which it is expected will be down to the estimated depth of 4,615 feet toward the end of 1900. The necessary shaft and rock house has been ordered, together with the equipment and a large compressor. During the year 1899 the gross receipts from sales of copper, from interest, and from other sources aggregated \$2,952,098.91, while the costs were \$2,211,588.30, leaving a net income of \$740,510.61, out of which two dividends aggregating \$600,000 were paid. The total expenditures for construction, which were charged to operating expenses, were \$400,651.91. The cost of mining was somewhat larger than it was during the previous year, owing to an advance in wages and in all classes of material.

The annual report of the Osceola Consolidated Mining Company for the calendar year 1899 shows that there were mined 674,691 tons, of which 540,326 tons were put through the stamp mill, yielding 14,767,430 pounds of mineral, the cost of stamping having been 26.36 cents per ton of rock. The gross receipts during the year were \$1,791,471.01; the total cost having been \$1,256,638.72, leaving an income of \$534,832.29. Dividends aggregating \$558,450 were paid, thus leaving a deficit of \$23,617.71. At the beginning of the year there were available for the construction account \$84,969.18, to which were added \$32,787.96 from the sale of treasury stock. Out of this there were paid for new stamp-mill construction \$98,529.96, and \$1,958.84 for sinking two shafts on the South Kearsarge property. Besides

this there were expended for construction and shaft \$72,945.47 at the Osceola, the Tamarack, jr., and the Kearsarge; the sums being charged directly to operating expenses. Considerable delay was experienced in completing the new stamp mill, so that it was not in operation until early in November. The most interesting undertaking in connection with the mining operations was the opening out of what is known as the South Kearsarge property.

The new stamp mill of the Franklin Mining Company was put into commission in August, 1899, and during the remainder of the year crushed 89,789 tons, at an average cost of 32.30 cents. The result in product of mineral was 1,548,864 pounds, equivalent to 1,230,000 pounds of refined copper. The total expenditures on account of the Franklin, jr., mine and the new mill to January, 1900, were \$1,002,951.75, of which the stamp mill absorbed \$269,000.12. The mill has thus far stamped a little over 400 tons a day per head, there being four heads in the mill. The receipts for the year 1899 were \$202,647.81 from copper, \$32,851.28 from insurance on the old mill destroyed by fire, and \$37,153.58 from sales of 1,682 shares of stock. The running expenses at the mine were \$360,087.96; the expenses for smelting, freight, insurance, and interest, \$28,981.13, and the construction account during the year was \$235,080.06.

The annual report of the Wolverine Copper Company covers the fiscal year ending June 30, 1900. The product of the mine was 5,469,700 pounds of mineral, which yielded 86.96 per cent, or 4,756,646 pounds of refined copper, which sold at an average of 16.86 cents. During the year there were hoisted 215,951 tons of rock, of which 184,594 tons were stamped, the yield of the rock being 25.77 pounds per ton. The cost per ton of rock hoisted was \$1.52, while the cost per ton of rock stamped was \$1.77. The cost per pound of refined copper at the mine was 6.885 cents, and the smelting, freight, and marketing product 1.25 cents, making the total cost of refined copper 8.14 cents. During the year the cost per pound of refined copper, including the construction account, was 9.56 cents. The receipts during the year amounted to \$806,810.32, the average return per pound of copper having been 16.86 cents. The mining and smelting outlays were \$387,204.17, leaving a mining profit of \$419,606.15. The construction account and the price for the stamp-mill site aggregate \$72,688.54, thus leaving a net profit of \$346,917.61, and adding the surplus of the previous year of \$277,689.45, a total of \$624,607.06 was reached. Out of this there were paid in dividends \$240,000, leaving a surplus of \$384,607.06. The management confined the dividends to the sum named in order to provide a fund for the construction of a new stamp mill.

During the first seven months of 1899 the yield of the rock from the Atlantic mine reached the lowest point in the history of the enterprise, dropping to 11.56 pounds of copper per ton stamped. Then a change for the better began, the average for the last five months of the year being 13.28 pounds, carrying the average for the whole year up to 12.28 pounds per ton. In 1899 the mine produced 6,147,555 pounds

of mineral, yielding 4,675,882 pounds of refined copper, for which there was realized an average of 17.15 cents per pound. The working expenses at the mine were \$508,148.34. The smelting, freight, and all other expenses were \$63,009.03, and balance of interest account was \$1,870.11, making the net running expenses \$573,027.48. Since the total income was \$802,804.51, the surplus was \$229,777.03. Of this there was expended in construction \$78,527.18, leaving a net gain of \$151,249.85. Adding \$105,098.87, the surplus from 1898, there was reached a net surplus of \$256,348.72, out of which dividends aggregating \$80,000 were paid.

The following record of costs for a series of years shows how it was possible by close and intelligent management to treat profitably an ore yielding so small a percentage of copper.

Cost of copper at the Atlantic mine per ton of rock treated.

Items of cost.	1888.	1889.	1890.	1891.	1892.	1893.
Mining, selecting, breaking, and all surface expenses, including taxes..	<i>Cents.</i> 83. 73	<i>Cents.</i> 87. 87	<i>Cents.</i> 104. 14	<i>Cents.</i> 95. 29	<i>Cents.</i> 83. 98	<i>Cents.</i> 79. 49
Transportation to mill....	3. 47	3. 88	3. 46	3. 86	3. 33	3. 28
Stamping and separating..	26. 89	27. 78	27. 78	25. 82	25. 09	24. 95
Freight, smelting, marketing, and New York expenses	21. 42	20. 22	20. 37	18. 47	17. 67	18. 22
Total working expenses.....	135. 51	139. 75	155. 75	143. 44	130. 07	125. 94
Total expenditures, including construction	142. 82	153. 27	166. 70	154. 51	133. 51	160. 24
Net profit.....	54. 36	6. 23	27. 71	0. 16		
Yield of copper, per cent..	0. 667	0. 663	0. 650	0. 615	0. 615	0. 669

Items of cost.	1894.	1895.	1896.	1897.	1898.	1899.
Mining, selecting, breaking, and all surface expenses, including taxes..	<i>Cents.</i> 75. 18	<i>Cents.</i> 75. 25	<i>Cents.</i> 76. 43	<i>Cents.</i> 73. 43	<i>Cents.</i> 89. 11	<i>Cents.</i> 103. 60
Transportation to mill....	3. 03	4. 08	4. 96	4. 54	5. 55	6. 50
Stamping and separating..	23. 30	22. 20	24. 87	23. 94	24. 11	23. 35
Freight, smelting, marketing, and New York expenses	17. 71	18. 81	17. 47	17. 03	16. 04	17. 04
Total working expenses.....	119. 22	120. 34	123. 73	118. 94	134. 81	150. 49
Total expenditures, including construction	165. 07	156. 05	135. 99	129. 69	153. 59	171. 11
Yield of copper, per cent..	0. 703	0. 730	0. 660	0. 648	0. 59	0. 614

At the mine of the Baltic Mining Company, one of the most promising discoveries within recent years on Lake Superior, good progress was made during 1899. While almost exclusively engaged in development work, the mine produced 621,336 pounds of copper, which sold at an average price of 15.93 cents. The Baltic leased one small stamp of the Atlantic mill, which it ran very largely to the end of the year. In that time there were stamped 35,411 tons of rock, yielding 789,763 pounds of mineral. The company has purchased a site on Lake Superior near the Salmon Trout River and has begun the erection of a stamp-mill building to contain four heads of modern-style stamps, only two of which, however, will be started during the current year. The total receipts, including \$227,250 for assessment No. 3, payable September 18, 1899, were \$338,450.40; the expenditure at the mine was \$195,416.89, and other outlays carried the total to \$210,318. This left a balance of receipts of \$128,132.40. The surplus from 1898 was \$39,711.38, and there is a balance due on assessment of \$72,751, leaving net available assets on December 31, 1899, to the amount of \$240,594.78.

The Isle Royale Copper Company is a consolidation, effected on April 10, of the Isle Royale Consolidated and the Miners Copper Company. Work is actively progressing in the development of its property. Ground through the old Grand Portage and Isle Royale is being opened, and shafts and air compressors, engines, and other machinery have been placed. The erection of a stamp mill with three heads has begun. During 1899 the payments for mine work and machinery aggregated \$330,677. At the date of the consolidation there was cash on hand amounting to \$1,794,069, and the receipts for interest during the year were \$23,057. At the end of the year a balance of \$1,486,449 was on hand.

The Mayflower Mining Company owns 840 acres to the southeast of the Kearsarge and Wolverine mines. During the period of ten months ending February 28, 1900, a good deal of exploratory work was done on the surface and through the sinking of a number of shafts, the expenditures on that account having been \$45,023. The company has sold 100,000 shares of stock at \$8 and has received \$3,525 for interest. Payments for property aggregated \$540,000. At the end of the fiscal period there was a balance of \$218,502.

The Adventure Consolidated Copper Company is opening up the Butler and Knowlton lodes on its property of 1,696 acres. From November 1, 1898, to the end of 1899 the company spent \$114,173 for machinery, supplies, and labor, and paid \$250,000 for its property. The receipts were \$504,023, including \$500,000 from the sale of stock. The balance on hand at the end of the fiscal year was \$139,850.

The Victoria Copper Mining Company began work in March, 1899, and during the year \$60,842.03 were spent in preparatory work, min-

ing, plant supplies, etc. The outlays for real estate, organization, etc., were \$383,419.10. The receipts aggregated \$708,106.17, of which \$700,000 was for capital stock.

MONTANA.

Production in Montana has recovered somewhat, and in spite of litigation is likely to show a further development. A new feature during 1899 was the shipment of considerable quantities of ore from the Liquidator mine to the pyritic smelting plant of the Golden Reward Company at Deadwood, South Dakota.

A dominating influence in the Butte district is exercised by the Amalgamated Copper Company, organized April 29, 1900, with a capital of \$75,000,000. The company owns the stock of the Washoe Copper Company of Butte, with a capital of \$5,000,000; of the Colorado Smelting and Mining Company of Butte, with a capital of \$2,500,000; of the Diamond Coal and Coke Company of Diamondville, Wyoming, with a capital of \$1,500,000, and of the Big Blackfoot Milling Company of Bonner, Montana, with a capital of \$700,000. The company also owns a majority of the stock of the Anaconda Copper Mining Company of Butte and Anaconda, with a capital stock of \$30,000,000; of the stock of the Parrott Silver and Copper Company of Butte, with a capital stock of \$2,298,500, and of the Hennessey Mercantile Company of Butte and Anaconda, with a capital stock of \$1,500,000. The Amalgamated Copper Company is also a large holder of the stock of the Boston and Montana Consolidated Copper and Silver Mining Company of Butte. During the year 1899 the companies owned by this company produced 130,682,168 pounds of copper.

Since the Anaconda has passed into the control of the new interest very extensive changes and improvements have been undertaken in the concentrating and smelting plant at Anaconda.

The Boston and Montana Consolidated Copper and Silver Mining Company had an exceptionally prosperous year during 1899. The report shows gross receipts for the sales of copper, silver, gold, and bluestone of \$11,257,280.18; the costs were: expenses at Butte and Great Falls, and for electrolytic refining, \$4,385,078.76, and expenses of handling copper \$817,352.19, leaving a net income for the year of \$6,054,849.23. There were expended for interest on bonded debts, less interest receipts, \$37,504.48, and \$37,500 that were added to the sinking fund. This left available for dividends \$5,979,844.75; out of this sum there were paid \$5,400,000, leaving a surplus for the year of \$579,844.75. Since the balance of assets on December 31, 1898, was \$4,516,246.89, the balance of assets on December 31, 1899, was \$5,096,091.64.

Mining developments have been carried along until on January 1, 1900, the estimated reserve and undercut were placed at 2,500,000 tons.

In view of the fact that large reserves necessitate a corresponding expense of maintenance, it is proposed in the future to maintain the reserve at or about this figure.

During 1899 the company operated the Butte and Boston Smelting Works under lease, but surrendered the same on February 1, 1900.

Very considerable additions have been made to the Great Falls plant, two new blast furnaces having been put in operation, and twelve McDougall calciners having been installed. Work was begun on a new concentrating plant to double the capacity of the works, and it is proposed, in view of this increase in the output of concentrates, to add two blast furnaces, nine additional McDougall calciners, two large reverberatory furnaces, and four additional converter stands. These additions, which when completed will increase the capacity of the plant about two-thirds, will occupy the greater part of the year 1900.

The annual report of the Parrott Silver and Copper Company of Butte for the fiscal year ending April 30, 1900, showed assets aggregating \$3,767,558.54, against liabilities of \$2,300,000 capital stock and \$63,323.52 for sundry accounts payable. There were paid during the year ending April 30, 1900, dividends aggregating \$1,379,100, the surplus at the end of the year being \$1,404,235.02.

ARIZONA.

Arizona continued during 1899 its extraordinary development as a copper producer, and will show a further increase in 1900.

At Bisbee the Copper Queen has somewhat enlarged its product, while the other concerns in the district have not yet entered the ranks of producers.

In the Clifton district the Detroit has completed its converter plant and has moderately increased the capacity. A large concentrating mill has been erected to handle low-grade ores.

The Arizona Copper Company in the same district is controlled by a Scotch corporation, whose report for 1899 shows total receipts of £672,813, including £555,715 from the sale of copper, £115,539 from the Arizona and New Mexico Railroad, and £1,559 from miscellaneous sources. The expenditures include £311,727 for mining, £37,340 for railroad, and £7,734 for general purposes. For interest, preferred dividends, etc., £121,517 were expended, and £45,000 were assigned to reserve. Of the balance of £149,495, swollen to £166,165 by £16,670 brought forward from the previous year, dividends aggregating £119,646 on the common stock were paid and £46,519 were carried to surplus. The company is producing close to 10,000 short tons of copper per annum. The company is building special works for treating the tailings from the two sulphide concentrating mills which are being operated. The works are to have a capacity of 400 tons per day, and it is calculated that an extraction of one-half of

1 per cent of copper will be obtained. No serious or comprehensive addition to the product in the capacity of the general concentrating and smelting plant is yet contemplated.

The United Verde during 1899, according to published reports, reached a total production of 43,390,590 pounds of copper. The receipts were \$5,775,621 for copper, \$293,221 for silver, \$288,598 for gold, \$16,719 for anodes, and \$21,708 from miscellaneous sources, a total of \$6,395,867. Since the expenditures reached \$2,660,346, there was a mining profit of \$3,735,521, out of which \$3,000,000 were paid in dividends. Included in the expenses were \$555,147 for mine development, \$102,916 for ore roasting, \$1,036,191 for converter expenses, \$427,412 for freight, and \$218,978 for depreciation. The construction expenses paid out of surplus profit were \$801,110.

At Globe the Old Dominion contributed in a modest degree to the total of the Territory. Improvements and developments were inaugurated in 1899, which when completed will raise the output to about 8,000,000 pounds per annum. This company has purchased the Continental mine.

The smelting plant at Williams, built by Lombard, Goode & Co., is now owned by the Anita Consolidated Copper Company, which also owns most of the mines the development of which has been continued. They are located in the Grand Canyon district and have been made more accessible by the new Santa Fe and Grand Canyon Railroad. The smelter has not been in operation, all the ore mined in the course of development having been shipped to the El Paso works. It is possible that it may be moved to the mines.

The Helvetia Copper Company began smelting operations late in 1899, and has become a regular, although as yet a small, contributor to the copper supply.

A number of smaller smelters have either started in 1899 or are under construction.

UTAH.

Among the recent producers of copper which are assuming some importance is the Highland Boy Mining Company, controlling the Consolidated Gold Mines of Utah. The deposit consists mainly of sulphides, which, according to the smelting operations of the first year, yielded 4.43 per cent of copper, 1.27 ounces of silver, and .11 ounce of gold. The smelter started in the middle of 1899, and up to June 30, 1900, produced from 73,331 tons of ore 6,497,205 pounds of fine copper, 93,221 ounces of silver, and 8,254 ounces of gold. The smelter is being enlarged from a capacity of 225 tons per day to 450 tons per day, which will carry the annual output to 12,000,000 pounds fine. The first annual report of the Utah Consolidated, which covers the period of fifteen months from April 1, 1899, to June 30, 1900,

shows total receipts of \$1,168,459, including \$859,308 from the sale of copper, \$37,224 from silver, \$116,386 from gold, and \$155,541 from miscellaneous sources. The outlays were \$126,782 for mining, \$284,228 for smelting, \$45,970 for maintenance and development, and \$49,852 for general expenses and interest. This left \$661,627 of net receipts. Out of this \$220,000 are to be applied to improvements, including \$178,000 for the smelter extension.

Development work has been progressing at a property controlled by Lewisohn Brothers, near the Nevada line. The ore presents metallurgical problems which are still under consideration. While a large amount of ore has been proved, no metal product need be expected in the near future.

NEW MEXICO.

The Santa Fe Company is building a new smelting plant, which is expected to be in operation toward the close of 1900. It will produce matte at the rate of about 200,000 to 250,000 pounds fine per month.

COLORADO.

The bulk of the copper obtained in Colorado is derived from the smelting of complex ores, the red metal being an incidental product. Nearly all the lead smelters make cupriferous mattes in which the copper contents of the ores have been concentrated. Leadville, however, continues to turn out increasing quantities of ores in which copper is the chief carrier of the precious metals, and the mines in the vicinity of Salida are assuming growing importance.

WYOMING.

Wyoming is credited with having a series of very important copper belts, of which that in the vicinity of Grand Encampment is being developed. A fair tonnage of high-grade ore has found its way from Wyoming to outside smelters, Chicago in particular treating it.

CALIFORNIA.

There has been a good deal of activity in copper mining in California, but as yet the number of important actual producers is small, being limited to the Mountain in Shasta County, the Madera, and the Ivanpah. It is understood, however, that important interests are developing property at no great distance from the Mountain, and the old mines of Copperopolis, which once made California famous, are being reopened. The old Newton mines, which for many years produced some precipitate, are also getting into working shape.

IDAHO.

The Seven Devils district in Idaho does not yet possess transportation facilities, although the building of the connecting railroad has progressed. Until that is completed no notable quantities of metal need be expected from that source.

NEVADA.

In Nevada a few reduction plants have been started during 1899, but the quantity of copper produced thus far has been small, work having been intermittent.

TENNESSEE.

The Ducktown Copper, Sulphur and Iron Company is an English corporation operating in the Ducktown district in Tennessee and producing a little over 3,000,000 pounds per year. During the year 1899 the earnings of the company were £28,291, out of which there were paid 7 per cent on £10,000 preference shares, 15 per cent on £50,000 ordinary shares, and £32 10s. each on 200 founders' shares. There is an outstanding first mortgage of £44,500 at 5 per cent and a second mortgage of £7,905 at 7 per cent.

The Tennessee Copper Company has been building a large modern smelting plant, and is developing the property, so that when smelting begins in May, 1901, a monthly production of about 800,000 pounds fine copper will be attained.

VERMONT.

The Ely and Copperfield mines in Vermont are now controlled by George Westinghouse, of Pittsburg, while at the Elizabeth mines at South Strafford smelting operations have been carried on for some time.

An interesting undertaking is the reopening and development of the famous old Schuyler mines near Arlington, where a concentrating plant is now in course of construction. It is proposed to roast the concentrates, dissolve with dilute sulphuric acid, and deposit the copper electrolytically.

IMPORTS.

The imports of fine copper contained in ores, and of regulus and black copper, and of ingot copper, old copper, plates not rolled, rolled plates, sheathing metal, and manufactures not otherwise specified, and of brass are given in the following tables:

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Fine copper contained in ores, and regulus and black copper, imported and entered for consumption in the United States, 1867 to 1899, inclusive.

Year ending—	Finer copper contained in ores.		Regulus and black copper. ^a		Total value.
	Quantity.	Value.	Quantity.	Value.	
	Pounds.		Pounds.		
June 30, 1867..	-----	\$936, 271	-----	-----	\$936, 271
1868..	3, 496, 994	197, 203	-----	-----	197, 203
1869..	24, 960, 604	448, 487	-----	-----	448, 487
1870..	1, 936, 875	134, 736	-----	-----	134, 736
1871..	411, 315	42, 453	499	\$60	42, 513
1872..	584, 878	69, 017	4, 247	1, 083	70, 100
1873..	702, 086	80, 132	1, 444, 239	279, 631	359, 763
1874..	606, 266	70, 633	28, 880	5, 397	76, 030
1875..	1, 337, 104	161, 903	12, 518	2, 076	163, 979
1876..	538, 972	68, 922	8, 584	1, 613	70, 535
1877..	76, 637	9, 756	1, 874	260	10, 016
1878..	87, 039	11, 785	-----	-----	11, 785
1879..	51, 959	6, 199	-----	-----	6, 199
1880..	1, 165, 283	173, 712	2, 201, 394	337, 163	510, 875
1881..	1, 077, 217	124, 477	402, 640	51, 633	176, 110
1882..	1, 473, 109	147, 416	224, 052	30, 013	177, 429
1883..	1, 115, 386	113, 349	-----	-----	113, 349
1884..	2, 204, 070	219, 957	2, 036	204	220, 161
1885..	3, 665, 739	343, 793	285, 322	20, 807	364, 600
Dec. 31, 1886..	4, 503, 400	341, 558	1, 960	98	341, 656
1887..	3, 886, 192	194, 785	27, 650	1, 366	196, 151
1888..	4, 859, 812	381, 477	4, 971	324	381, 801
1889..	3, 772, 838	274, 649	60, 525	4, 244	278, 893
1890..	3, 448, 237	241, 732	221, 838	15, 688	257, 420
1891..	8, 931, 554	774, 057	2, 403, 919	214, 877	988, 934
1892..	7, 669, 978	453, 474	303, 087	17, 390	470, 864
1893..	7, 256, 015	435, 448	3, 175, 559	202, 197	637, 645
1894..	4, 804, 614	260, 402	5, 873, 820	144, 832	405, 234
1895..	b8, 921, 920	213, 689	b3, 104, 640	125, 853	339, 542
1896..	b2, 620, 800	126, 580	b3, 427, 200	210, 725	337, 305
1897..	b43, 919, 680	683, 497	2, 974, 720	226, 704	910, 201
1898..	b107, 253, 440	565, 245	1, 583, 680	92, 135	657, 380
1899..	b120, 934, 616	1, 141, 180	7, 763, 885	784, 232	1, 925, 412

^a Not enumerated until 1871.

^b Ores.

Copper imported and entered for consumption in the United States, 1867 to 1899, inclusive.

Year ending—	Bars, ingots, and pigs.		Old, fit only for remanufacture.		Old, taken from bottoms of American ships abroad. ^a	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Pounds.</i>	
June 30, 1867..	1, 635, 953	\$287, 831	569, 732	\$81, 930		
1868..	61, 394	6, 935	318, 705	42, 652		
1869..	13, 212	2, 143	290, 780	34, 820		
1870..	5, 157	418	255, 386	31, 931		
1871..	3, 316	491	369, 634	45, 672		
1872..	2, 638, 589	578, 965	1, 144, 142	178, 536		
1873..	9, 697, 608	1, 984, 122	1, 413, 010	255, 711	32, 307	\$4, 913
1874..	713, 935	134, 326	733, 326	137, 087	9, 500	930
1875..	58, 475	10, 741	396, 320	55, 564	11, 636	1, 124
1876..	5, 281	788	239, 987	35, 545	10, 304	1, 981
1877..	230	30	219, 443	28, 608	41, 482	5, 136
1878..	1	1	198, 749	25, 585		6, 004
1879..	2, 515	352	112, 642	11, 997	11, 000	1, 107
1880..	1, 242, 103	206, 121	695, 255	91, 234		
1881..	219, 802	36, 168	541, 074	63, 383	14, 680	1, 504
1882..	6, 200	836	508, 901	59, 629	16, 075	1, 629
1883..			330, 495	36, 166	9, 415	666
1884..	6542	107	149, 701	12, 099		554
1885..	914	172	81, 312	6, 658		1, 160
Dec. 31, 1886..	276	37	37, 149	2, 407		584
1887..	212	22	39, 957	2, 374		120
1888..	1, 787	299	37, 620	2, 535		
1889..	3, 160	522	19, 912	1, 176		
1890..	5, 189	859	284, 789	26, 473		
1891..	2, 556	389	134, 407	9, 685		
1892..	22, 097	2, 588	71, 485	6, 114		
1893..	554, 348	58, 480	59, 375	6, 945		6, 326
1894..	606, 415	42, 688	160, 592	15, 726		1, 143
1895..	7, 979, 322	726, 347	1, 336, 901	109, 340		
1896..	9, 074, 379	750, 976	2, 422, 554	196, 419		
1897..	12, 646, 552	1, 142, 526	1, 780, 390	158, 829		
1898..	35, 892, 944	3, 094, 541	1, 986, 133	168, 405		
1899..	64, 282, 583	9, 350, 582	6, 678, 145	758, 010		

^a Not enumerated until 1873.

^b Includes "plates not rolled" since 1884.

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Copper imported and entered for consumption in the United States, etc.—Continued.

Year ending—	Plates not rolled.		Plates rolled, sheets, pipes, etc.	
	Quantity.	Value.	Quantity.	Value.
	Pounds.		Pounds.	
June 30, 1867.....				\$1, 101
1868.....				1
1869.....				39
1870.....				2, 039
1871.....	430	\$129		7, 487
1872.....	148, 192	33, 770		18, 895
1873.....	550, 431	97, 888		4, 514
1874.....				27
1875.....	8	4		617
1876.....	5, 467	600		326
1877.....				203
1878.....				1, 201
1879.....	27, 074	4, 496		786
1880.....	120	11		4, 134
1881.....	20	3		82
1882.....			5, 855	1, 551
1883.....			2, 842	379
1884.....			6, 529	2, 330
1885.....			470	120
Dec. 31, 1886.....			3, 770	339
1887.....			37, 925	5, 493
1888.....			5, 208	737
1889.....			13, 848	2, 082
1890.....			4, 209	917
1891.....			122, 219	23, 291
1892.....			1, 788	600
1893.....			7, 056	1, 065
1894.....			12, 681	1, 821
1895.....			27, 156	2, 586
1896.....			34, 481	4, 834
1897.....			3, 116	430
1898.....			11, 793	2, 193
1899.....			827	331

MINERAL RESOURCES.

Copper imported and entered for consumption in the United States, etc.—Continued.

Year ending—	Sheathing metal, in part copper. ^a		Manufactures not otherwise specified.	Total value.
	Quantity.	Value.	Value.	
	<i>Pounds.</i>			
June 30, 1867.....	220,889	\$37,717	\$15,986	\$424,565
1868.....	101,488	18,852	21,492	89,932
1869.....	43,660	6,592	43,212	86,806
1870.....			485,220	519,608
1871.....			668,894	722,673
1872.....			1,007,744	1,817,910
1873.....			869,281	3,216,429
1874.....	282,406	50,174	125,708	448,252
1875.....	136,055	23,650	35,572	127,272
1876.....	18,014	2,903	29,806	71,949
1877.....	110	22	41,762	75,761
1878.....	647	55	35,473	68,319
1879.....	300	20	39,277	58,035
1880.....	6,044	693	130,329	432,522
1881.....	39,520	4,669	284,509	390,318
1882.....			77,727	141,372
1883.....	6,791	1,047	40,343	78,601
1884.....	19,637	926	55,274	71,290
1885.....	86,619	9,894	61,023	79,027
Dec. 31, 1886.....	21,573	1,917	31,871	37,155
1887.....	18,189	1,867	37,289	47,174
1888.....	23,622	2,696	14,567	20,834
1889.....	23,520	2,572	13,430	19,782
1890.....	37,458	4,467	24,752	57,468
1891.....	228,486	29,112	12,926	75,403
1892.....	417,134	51,380	49,764	110,446
1893.....	1,670	167	16,166	89,149
1894.....	8,422	1,470	3,851	66,699
1895.....	5,698	389	13,166	851,828
1896.....	3,183	303	20,953	973,485
1897.....	15,282	1,929	30,729	1,334,443
1898.....	5,801	679	^b 20,071	3,285,889
1899.....	13,763	6,310	13,629	10,128,862

^a Does not include copper sheathing in 1867, 1868, and 1869.^b Including wire.

By customs districts the imports of copper have been as follows in the calendar year 1899:

Imports of copper pigs, bars, ingots, plates, old and other unmanufactured, by customs districts, calendar year 1899.

Customs district.	Quantity.	Value.
	<i>Pounds.</i>	
Baltimore, Md	12,645,594	\$2,086,086
Newark, N. J	563,071	56,308
New York, N. Y	47,905,124	6,785,681
Passamaquoddy, Me.	63,459	5,738
Perth Amboy, N. J.	1,548,221	278,941
Corpus Christi, Tex	5,331,323	551,739
Arizona	2,656,631	247,445
San Francisco, Cal	61,441	5,021
Champlain, N. Y	368,028	49,717
Detroit, Mich	341,067	19,928
All other districts	438,381	52,786
Total	71,922,340	10,139,390

Imports of copper ore and regulus, by customs districts, during the calendar year 1899.

Customs districts.	Quantity.	Value.
	<i>Tons.</i>	
New York, N. Y	24,054	\$685,000
Corpus Christi, Tex	136	42,114
Paso del Norte, Tex	56	9,588
Arizona	1,585	317,926
Puget Sound, Wash	2,753	747,049
Memphremagog, Vt	361	29,540
Oswegatchie, N. Y	1,802	244,451
All other districts	890	167,915
Total	31,637	2,243,583

MINERAL RESOURCES.

The sources of the copper imports are shown in the following tables:

Imports of copper and copper ore.

PIGS, BARS, INGOTS, PLATES, OLD AND OTHER UNMANUFACTURED.

Countries.	Calendar year 1899.	
	<i>Pounds.</i>	
France	7, 121, 944	\$1, 067, 231
Germany	896, 972	134, 982
United Kingdom.....	34, 188, 172	5, 200, 036
Dominion of Canada:		
Quebec and Ontario	746, 848	81, 078
British Columbia	647, 541	64, 238
West Indies:		
British	507, 006	52, 675
Cuba	3, 041, 631	328, 929
San Domingo	49, 851	5, 407
Mexico	19, 703, 367	2, 511, 760
Japan	112, 020	15, 187
British Australasia	4, 029, 645	584, 698
All other countries	877, 345	93, 169
Total	71, 922, 340	10, 139, 390

ORE AND REGULUS.

	<i>Tons.</i>	
Germany	377	\$103, 618
Dominion of Canada:		
Quebec and Ontario	1, 424	268, 292
British Columbia	4, 298	938, 544
Newfoundland and Labrador.....	19, 109	97, 966
Mexico	3, 681	606, 859
All other countries	2, 748	228, 304
Total	31, 637	2, 243, 583

For a number of years the official import statistics do not give the copper contents of ores and mattes imported, but report only the gross weight of the ores and of the regulus or matte, lumping the two together. The only means of ascertaining whether the material reported is ore or regulus is to study the source from which it came and to observe the valuation placed on it.

In the above table these indications point to the conclusion that the imports during 1899 from Germany, Quebec and Ontario, British

Columbia, and Mexico consisted of matte, the total being 9,780 long tons. At 55 per cent fine copper contents this would represent imports of about 12,250,000 pounds of fine copper. The imports from "other countries" of 2,748 tons may be taken as low-grade matte and high-grade ore, for which an average of 25 per cent has been assumed, thus representing about 1,500,000 pounds of the metal.

In addition thereto there is copper in some pyrites imported for sulphuric-acid manufacture from Spain and from Canada, the fine copper contents being estimated at 4,500,000 pounds in 1899, this figure being checked to some extent by the returns of copper smelters and chemical works which handled the cinder.

Then there is usually left out of account in the import statistics the copper contents of the Sudbury nickel mattes, the quantity for 1899 being estimated at 5,550,000 pounds.

Thus the supply through imports during 1899 may be stated as follows:

<i>Imports of copper in furnace material and ores in 1899.</i>	
	Pounds.
In mattes	13, 750, 000
In pyrites	4, 500, 000
In nickel matte	5, 550, 000
Total	23, 800, 000

For 1898 these sources of supply were estimated to account for 19,750,000 pounds.

The import movement of pigs and bars has assumed very much larger dimensions and is significant from more than one point of view. The imports from the West Indies are old copper exclusively, and the same is true of the greater quantity of material from miscellaneous sources. A part of the imports from Mexico is copper in transit from Boleo to European refineries. It was in 1899, however, that the handling of foreign unrefined copper first became a very important feature. The bars from British Australasia and a large part of those from Great Britain were brought to this country to be worked by the electrolytic process, and to be subsequently reexported. Of course the copper coming from England originated in producing countries, a very large part of it being Chile bars. A large part of the Mexican copper is blister, produced at works in that country controlled by companies in the United States owning refineries at tide water. The refineries on New York Harbor and at Baltimore treat practically all of this material, as is clearly shown by the foregoing table, in which the imports are grouped by ports of entry.

EXPORTS.

The exports of copper in the form of ore (including matte), ingots, and manufactured copper, for a series of years, have been as follows:

Copper and copper ore of domestic production exported from the United States, 1864 to 1899.

[Cwts. are long hundredweights of 112 pounds.]

Year ending—	Ore and matte.		Pigs, bars, sheets, and old.	
	Quantity.	Value.	Quantity.	Value.
	<i>Cwts.</i>		<i>Pounds.</i>	
June 30, 1864.....	109,581	\$181,298	102,831	\$43,229
1865.....	225,197	553,124	1,572,382	709,106
1866.....	215,080	792,450	123,444	33,553
1867.....	87,731	317,791	a 4,637,867	303,048
1868.....	92,612	442,921	1,350,896	327,287
1869.....	121,418	237,424	1,134,360	233,932
1870.....	a 19,198	537,505	2,214,658	385,815
1871.....	a 54,445	727,213	581,650	133,020
1872.....	35,564	101,752	267,868	64,844
1873.....	45,252	170,365	38,958	10,423
1874.....	13,326	110,450	503,160	123,457
1875.....	a 51,305	729,578	5,123,470	1,042,536
1876.....	15,304	84,471	14,304,160	3,098,395
1877.....	21,432	109,451	13,461,553	2,718,213
1878.....	32,947	169,020	11,297,876	2,102,455
1879.....	23,070	102,152	17,207,739	2,751,153
1880.....	21,623	55,763	4,206,258	667,242
1881.....	9,958	51,499	4,865,407	786,860
1882.....	25,936	89,515	3,340,531	565,295
1883.....	112,923	943,771	8,221,363	1,293,947
1884.....	386,140	2,930,895	17,044,760	2,527,829
1885.....	432,300	4,739,601	44,731,858	5,339,887
Dec. 31, 1886.....	417,520	2,241,164	19,553,421	1,968,772
1887.....	501,280	2,774,464	12,471,393	1,247,928
1888.....	794,960	6,779,294	31,706,527	4,906,805
1889.....	818,500	8,226,206	16,813,410	1,896,752
1890.....	431,411	4,413,067	10,971,899	1,365,379
1891.....	672,120	6,565,620	69,279,024	8,844,304
1892.....	943,040	6,479,758	30,515,736	3,438,048
1893.....	835,040	4,257,128	138,984,128	14,213,378
1894.....	87,040	440,129	162,393,000	15,324,925
1895.....	276,480	1,631,251	121,328,390	12,222,769
1896.....	414,265	2,393,914	259,223,924	27,822,280
1897.....	181,280	1,199,029	277,255,742	30,597,645
1898.....	186,860	755,443	291,955,905	33,598,869
1899.....	70,080	382,989	247,370,681	41,250,166

a Evidently errors in quantities.

Copper and copper ore of domestic production exported, etc.—Continued.

Year ending—	Value of manufactured product.	Total value.
June 30, 1864.....	\$208, 043	\$432, 570
1865.....	282, 640	1, 544, 870
1866.....	110, 208	936, 211
1867.....	171, 062	791, 901
1868.....	152, 201	922, 409
1869.....	121, 342	592, 698
1870.....	118, 926	1, 042, 246
1871.....	55, 198	915, 431
1872.....	121, 139	287, 735
1873.....	78, 288	259, 076
1874.....	233, 301	467, 208
1875.....	43, 152	1, 815, 266
1876.....	343, 544	3, 526, 410
1877.....	195, 730	3, 023, 394
1878.....	217, 446	2, 488, 921
1879.....	79, 900	2, 933, 205
1880.....	126, 213	849, 218
1881.....	38, 036	876, 395
1882.....	93, 646	748, 456
1883.....	110, 286	2, 348, 004
1884.....	137, 135	5, 595, 859
1885.....	107, 536	10, 187, 024
Dec. 31, 1886.....	76, 386	4, 386, 322
1887.....	92, 064	4, 114, 456
1888.....	211, 141	11, 897, 240
1889.....	86, 764	10, 209, 722
1890.....	139, 949	5, 918, 395
1891.....	293, 619	15, 703, 543
1892.....	245, 064	10, 162, 870
1893.....	464, 991	18, 935, 497
1894.....	378, 040	16, 143, 094
1895.....	1, 084, 289	14, 938, 309
1896.....	819, 017	31, 035, 211
1897.....	958, 379	32, 755, 053
1898.....	1, 190, 939	35, 545, 251
1899.....	1, 852, 499	43, 485, 654

The destination of our exports of copper bars, ingots, plates, and old copper during the years 1895, 1896, 1897, 1898, and 1899 is shown by the following table, the data having been furnished by the Bureau of Statistics:

Exports of copper bars and ingots for 1895, 1896, 1897, 1898, and 1899, and countries to which exported.

Country.	1895.	1896.	1897.	1898.	1899.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
United Kingdom . . .	24, 064, 694	78, 479, 716	63, 774, 004	88, 443, 870	50, 738, 291
Austria	3, 228, 545	6, 532, 949	5, 918, 993	7, 478, 730	6, 354, 287
Belgium	8, 384, 995	9, 648, 271	16, 651, 776	13, 613, 183	5, 069, 456
France	25, 266, 032	45, 502, 864	59, 630, 864	53, 909, 508	58, 450, 866
Germany	14, 962, 257	29, 609, 837	29, 746, 200	42, 891, 345	49, 285, 139
Netherlands	40, 451, 380	72, 994, 600	86, 581 616	72, 418, 633	69, 304, 699
Italy	901, 485	4, 067, 160	3, 757, 920	3, 733, 672	3, 449, 565
Russia	2, 968, 001	10, 741, 821	8, 515, 772	7, 340, 276	2, 689, 610
Mexico	151, 664	170, 340		253, 975	285, 222
British North Amer- ica	398, 906	234, 845	2, 678, 597	1, 523, 505	985, 525
West Indies	1, 721	1, 241, 705		6, 143	5, 599
Other countries	548, 710			343, 065	208, 072
Total	121, 328, 390	259, 224, 108	277, 255, 742	291, 955, 905	246, 826, 331

The following table shows the export ports:

Exports of ingots, bars, and old copper in 1897, 1898, and 1899, by ports.

District.	1897.	1898.	1899.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Baltimore, Md	88, 389, 939	87, 027, 133	90, 786, 853
Boston and Charlestown, Mass	928, 584	439, 368	1, 568, 197
Newark, N. J		673, 180	
Newport News, Va	5, 899, 609	2, 638, 868	4, 085, 580
Norfolk, Va		5, 249, 820	4, 707, 267
New York, N. Y	167, 344, 812	178, 400, 314	134, 412, 540
Philadelphia, Pa	227, 023	68, 624	2, 733, 692
New Orleans, La	13, 882, 408	15, 508, 831	7, 459, 623
Galveston, Tex		444, 920	3, 700
Detroit, Mich	164, 317	728, 689	320, 121
Huron, Mich	229, 226	118, 827	107, 562
Burlington, Vt	102, 718	410, 410	434, 340
All others	87, 106	246, 921	206, 856
Total	277, 255, 742	291, 955, 905	246, 826, 331

Summarizing the data presented, we have the following estimate of the copper supply to the United States markets for the years 1898 and 1899:

Copper supply of the United States for 1898 and 1899.

	1898.	1899.
	<i>Pounds.</i>	<i>Pounds.</i>
United States production	526, 512, 987	568, 666, 921
Imports:		
Bars	54, 166, 467	71, 922, 340
In ores and mattes	19, 750, 000	23, 800, 000
Total	600, 429, 454	664, 389, 261
Less exports:		
Bars	291, 955, 905	246, 826, 331
In ores and mattes	5, 420, 000	3, 500, 000
In blue vitriol at 25 per cent.	3, 843, 000	7, 350, 000
Available for home consumption..	299, 210, 549	406, 712, 930

No attempt has been made to take account of fluctuations in stocks, because it is absolutely impossible to procure a sufficiently large aggregate of official figures to give them value.

PRICES.

The following table summarizes the highest and lowest prices obtained for Lake copper monthly in the New York markets from 1860 to 1899, both inclusive:

Highest and lowest prices of Lake Superior ingot copper, by months, from 1860 to 1899.

[Cents per pound.]

Year.	January.		February.		March.		April.		May.		June.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1860..	24	23½	24	23½	23½	23	23½	23	23½	22½	22½	21½
1861..	20	19	19½	19	19½	19½	19½	19	19½	19½	19	18
1862..	28	27	28	25	25	23	23	21½	21½	20½	23	20½
1863..	35	31	37	35	37	31	31	30	30½	30	30½	30
1864..	41½	39	42	41½	42½	41½	44	42½	44	43	49	44
1865..	50½	46	46	44	44½	34	35	34	34	30	30½	28½
1866..	42	38	38	35½	35½	29½	30	28½	31	29	33	31
1867..	29½	27	27½	27½	27½	24	24½	23½	24½	24	24½	24
1868..	23½	21½	24	22½	24	23½	24½	23½	24½	24	24	23½

Highest and lowest prices of Lake Superior ingot copper, by months, etc.—Continued.

[Cents per pound.]

Year.	January.		February.		March.		April.		May.		June.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1869..	26½	23¾	27	26	26¾	24	24	23½	24½	23½	23½	22
1870..	22	21½	21½	20½	20¾	19	19¾	19½	19½	19	20½	19
1871..	22½	22	22¾	21¾	22	21½	21¾	21½	21¾	21¾	21½	21½
1872..	28½	27½	28¾	28½	30½	28¾	44	30½	42	36	34½	33
1873..	35	32½	35	34	35	34½	34½	33½	33½	32	31½	29½
1874..	25	24½	25	24½	24¾	24	25	24½	25	24½	24¾	24½
1875..	23½	21½	22¾	21¾	21¾	21½	21¾	21½	23½	22¾	23	23
1876..	23½	23	22¾	22½	22½	22	22¾	22	22¾	21	21	19½
1877..	19½	19	20½	19½	19½	19	19½	19½	19½	19	19¾	19
1878..	17½	17½	17½	17½	17½	16½	17	16½	16¾	16½	16¾	16½
1879..	16	15½	15½	15½	15½	15¾	16	15¾	16½	16	16½	16½
1880..	25	21¾	24½	24	24	22¾	22½	24	21	18	18½	17½
1881..	19¾	19¾	19¾	19½	19¾	19	19	18¾	18¾	18½	18½	16¾
1882..	20¾	20½	20	19	19½	18½	18½	17½	18½	18	18½	18
1883..	18½	18	17½	17¾	17½	17½	16	15¾	16	15½	15½	15
1884..	15	14½	15	14½	15	14½	15	14½	14½	14½	14½	14
1885..	11½	10¾	11½	10½	11½	10¾	11½	10½	11½	9½	11½	11
1886..	11½	11¾	11½	11¾	11½	11¾	11½	11¾	11½	10	10½	10
1887..	12	11½	11½	10½	10½	10¾	10½	10	10	9½	10½	10
1888..	17½	15½	16½	16	16½	15½	16½	16	16½	16½	16½	16½
1889..	17½	16½	16½	16½	15½	15	16	15½	12½	12	12½	12
1890..	14½	14½	14½	14½	14½	14	14½	14½	15½	14½	16½	15½
1891..	15	14½	14½	14½	14½	13½	13½	13½	13½	12½	13	12½
1892..	11	10½	10½	10½	12	10½	12	11½	12½	12	11½	11½
1893..	12½	12½	12½	12	12	11½	11½	11½	11½	11	11	10½
1894..	10½	10	10	9½	9½	9½	9½	9½	9½	9½	9½	9
1895..	10	9½	9½	9½	9½	9½	9½	9½	10½	9½	10½	10½
1896..	10½	9½	11½	10	11½	10½	11	10½	11½	10½	11½	11½
1897..	12	11½	12	11½	11½	11½	11½	11	11½	10½	11½	10½
1898..	11	10½	11½	11	12	11½	12½	11½	12½	12	11½	11½
1899..	17	13½	18	17	18	17	19½	18	19½	18½	18½	18

COPPER.

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Highest and lowest prices of Lake Superior ingot copper, by months, etc.—Continued.

[Cents per pound.]

Year.	July.		August.		September.		October.		November.		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1860..	21½	21½	21½	21½	22	21½	22	21½	21½	20½	20½	19½
1861..	18	17½	19	17½	20½	19	20½	20	22½	20½	27	22½
1862..	24½	22½	24½	24	27	24½	32½	27	32½	30½	31½	30½
1863..	32	29	31	29	32½	31	34½	32½	38½	34½	38½	38½
1864..	55	49	52½	50	52½	47½	48	47	49	47	50	48½
1865..	30½	28	32	30½	32½	31½	33	32½	45½	33	45½	39½
1866..	33½	31	31	30	31½	30½	31	30½	30½	26½	29	26½
1867..	26	24	26½	25½	27½	26½	26½	22½	23	22½	23	21½
1868..	24½	23½	24½	24	24	23½	24	23	24	22½	24½	23½
1869..	22½	21½	23½	21½	23	22	22½	22	22½	22	22	21½
1870..	20½	20½	21½	20½	21½	20½	21½	21½	23½	21½	22½	22½
1871..	22½	21½	23	22½	23½	22½	23½	23½	24½	23½	27	24½
1872..	34	33	35	32½	35½	33	34½	31½	32½	30½	32½	30½
1873..	29	26½	27½	27	27	25½	25½	24	24	21	25	23
1874..	24½	20	21	19	21½	21	22½	21½	23½	22½	23½	23½
1875..	23	22½	23½	23	23½	23½	23½	23	23½	23	23½	23½
1876..	20	19½	19½	18½	21	18½	21½	20½	20½	20	20	19½
1877..	19½	19	19	17½	18½	17½	18	17½	17½	17½	17½	17½
1878..	16½	16	16	16	16½	16	16	15½	15½	15½	16	15½
1879..	16½	16	16½	16	17	16½	21½	18	21½	21	21½	21
1880..	18½	18½	19½	19	18½	18½	18½	18½	18½	18½	19½	18½
1881..	16½	16	16½	16½	18½	16½	18½	18	19	18½	20½	19½
1882..	18½	18½	18½	18½	18½	18	18½	18	18½	18	18	17½
1883..	15½	15	15	15	15½	15½	15½	15½	15	14½	15	14½
1884..	14½	13½	14	13½	13½	13	13½	12½	13	12½	12½	11
1885..	11½	10½	11½	11	11½	10½	11½	10½	11½	10½	11½	11½
1886..	10½	10	10½	10	11½	10½	11½	11½	12	11½	12½	11½
1887..	10½	10½	10½	10½	11	10½	12½	10½	14½	11½	17½	14½
1888..	16½	16½	17	16½	17½	16½	17½	17½	17½	17½	17½	17½
1889..	12	12	12	12	12	11	11	11	13½	11½	14½	14
1890..	17½	16½	17½	17	17	17	16½	16½	16½	16½	16	15
1891..	12½	12½	12½	12	12½	12½	12½	11½	11½	11	11½	10½
1892..	11½	11½	11½	11½	11½	11½	11½	11½	12	11½	12½	12½
1893..	10½	10½	10½	9½	9½	9½	9½	9½	10½	9½	10½	10½
1894..	9½	9	9½	9	9½	9½	9½	9½	9½	9½	10	9½
1895..	11½	10½	12½	11½	12½	12	12	11½	11½	11	11	10
1896..	11½	11	11½	10½	10½	10½	10½	10½	11½	10½	11½	11½
1897..	11½	11	11½	11	11½	11½	11½	11	11	10½	11	10½
1898..	11½	11½	12½	11½	12½	12½	12½	12½	12½	12½	12½	12½
1899..	18½	18½	18½	18½	18½	18½	18½	17	17½	17	17	16½

The following table shows the fluctuations in prices in the English market:

Average values of copper in England.

Year.	Chile bars or G. O. B.			Ore, 25 per cent.		Precipitate.	
	<i>Long tons.</i>			<i>Per unit.</i>		<i>Per unit.</i>	
	£	s.	d.	s.	d.	s.	d.
1880.....	62	10	0	12	9	12	11
1881.....	61	10	0	12	6	13	8 $\frac{3}{4}$
1882.....	66	17	0	13	6 $\frac{1}{2}$	13	10 $\frac{1}{4}$
1883.....	63	5	10	12	4 $\frac{1}{2}$	12	10 $\frac{1}{4}$
1884.....	54	9	1	10	5 $\frac{1}{2}$	11	1
1885.....	44	0	10	8	4	9	0 $\frac{1}{2}$
1886.....	40	9	3	7	9	8	3 $\frac{1}{2}$
1887.....	43	16	11	8	6	8	11 $\frac{1}{2}$
1888.....	79	19	4 $\frac{1}{2}$	14	3 $\frac{1}{2}$	16	3
1889.....	49	10	5	9	6 $\frac{1}{2}$		
1890.....	54	5	5	10	7		
1891.....	51	9	8 $\frac{1}{2}$	9	7		
1892.....	45	12	8 $\frac{3}{4}$	8	7		
1893.....	43	15	6 $\frac{1}{4}$	8	5		
1894.....	40	7	4	7	6 $\frac{1}{2}$		
1895.....	42	19	7	8	4 $\frac{1}{2}$		
1896.....	46	18	1 $\frac{1}{4}$	9	1		
1897.....	49	2	6 $\frac{3}{4}$	9	5		
1898.....	51	16	7 $\frac{1}{4}$	10	1 $\frac{1}{2}$		
1899.....	73	13	8 $\frac{1}{2}$	13	2		

In detail, the fluctuations, monthly, of good merchant copper in the English market were as follows in 1895, 1896, 1897, 1898, and 1899:

Fluctuations in good merchant copper in England in 1895, 1896, 1897, 1898, and 1899.

[Per long ton.]

Month.	1895.			1896.			1897.			1898.			1899.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
January	40	13	9½	41	13	8½	50	10	8½	48	19	2	62	18	1½
February	39	14	3½	44	16	11½	51	6	6	49	12	8½	72	16	0
March	39	1	9½	45	8	0½	50	4	0½	50	13	2½	69	1	0½
April	40	3	6½	45	3	2½	48	16	9	51	14	2½	74	10	0½
May	43	0	0	46	6	6	48	10	11½	51	9	9½	77	5	11
June	42	15	6½	48	18	0	49	1	1½	50	8	0	76	2	0½
July	44	0	2½	49	3	7½	48	1	0½	50	3	1	76	19	3½
August	46	13	2½	47	16	9½	48	12	10½	51	10	7½	76	4	7½
September	46	15	7½	47	18	7½	49	8	5	52	2	8½	76	15	7
October	46	4	10	47	11	7	48	10	3	53	8	2	75	3	10½
November	43	16	3½	49	3	11	48	0	11½	55	18	8½	74	8	5½
December	42	15	11	48	16	9½	48	7	0½	55	18	11½	71	19	8

THE COPPER MARKET IN 1899.

The year opened with Lake copper at 13.25 cents, but under an enormous business the market rose rapidly during January until 16 cents was reached at its close. The movement continued in February until it culminated in the middle of the month with Lake copper selling at 18 cents. During this time an unprecedented speculation was progressing in copper-mining stocks on the Boston Stock Exchange, which was not without its influence upon the market for the metal. The activity of the market induced caution on the part of consumers, and realizing sales led to a reaction, which in March carried the price down to 17 cents for Lake copper. A recovery took place, however, and the Calumet and Hecla Company sold 5,000 tons to consumers at 18 cents. April brought a further rise, the market reaching 19½ cents, the highest price attained since the days of the famous Secretan syndicate in 1888. The market was fairly well maintained during the summer months, at the range of 18 to 18.50 cents, until the closing days of October, when a new basis was established by the sale of about 8,000 tons by the leading Lake company at 17 cents. Later in the year a fourth sale of 10,000 tons was made, for four months' delivery, the seller protecting the consumer against a decline.

THE WORLD'S PRODUCTION.

Messrs. Henry R. Merton & Co., of London, have compiled the following statement of the world's production, the figures being modified by this office where official statistics are available:

The copper production of the world, 1889 to 1899, inclusive.

[Long tons.]

Country.	1889.	1890.	1891.	1892.	1893.
EUROPE.					
Great Britain	905	935	720	495	425
Spain and Portugal:					
Rio Tinto.....	29,500	30,000	31,827	31,539	31,954
Tharsis	a 11,000	a 10,300	a 11,100	11,258	11,000
Mason and Barry ..	a 5,250	a 5,600	a 4,150	a 4,400	a 4,400
Seville.....	1,350	810	875	1,070	1,270
Other mines	a 7,170	a 4,790	a 6,390	a 7,992	6,225
Germany:					
Mansfeld	15,506	15,800	14,250	15,360	14,150
Other German	a 1,850	1,825	1,900	1,935	2,000
Austria.....	1,225	1,210	1,016	823	1,211
Hungary	a 300	a 300	285	285	210
Sweden.....	830	830	655	735	535
Norway	1,357	1,390	1,247	1,410	1,860
Italy	1,300	1,362	1,536	2,523	2,333
Russia.....	4,070	4,800	4,800	4,823	5,349
Total.....	81,613	79,952	80,751	84,648	82,922
NORTH AMERICA.					
United States	101,239	115,966	126,839	154,072	147,033
Canada.....	3,040	2,685	3,986	3,164	a 1,000
Newfoundland	2,615	1,735	2,040	2,390	2,040
Mexico:					
Boleo	3,280	3,450	4,175	6,415	7,980
Other Mexican.....	500	875	1,025	900	500
Total.....	110,674	124,711	138,065	166,941	158,553
SOUTH AMERICA.					
Chile.....	24,250	26,120	19,875	22,565	21,350
Bolivia:					
Corocoro	a 1,200	1,900	2,150	2,860	2,500
Peru	275	150	280	290	460
Venezuela:					
New Quebrada.....	6,068	5,640	6,500	3,100	2,850
Argentina	190	150	210	200	160
Total.....	31,983	33,960	29,015	29,015	27,320

a Estimated.

COPPER.

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The copper production of the world, 1889 to 1899, inclusive—Continued.

[Long tons.]

Country.	1889.	1890.	1891.	1892.	1893.
AFRICA.					
Algiers	160	120	120		
Cape of Good Hope:					
Cape Company ...	a 7,700	5,000	5,100	5,670	5,200
Namaqua Company		1,450	900	450	890
Total	7,860	6,570	6,120	6,120	6,090
ASIA.					
Japan	16,125	17,972	18,500	19,000	18,000
Total	16,125	17,972	18,500	19,000	18,000
AUSTRALASIA.					
New South Wales	4,082	3,455	4,192	4,185	1,558
South Australia	7,500	6,000	6,100	4,600	4,600
Total	11,582	9,455	10,292	8,785	6,158

Country.	1894.	1895.	1896.	1897.	1898.	1899.
EUROPE.						
Great Britain	445	580	555	555	a 640	550
Spain and Portugal:						
Rio Tinto	31,061	32,985	34,501	33,923	33,705	34,817
Tharsis	11,000	12,000	12,000	12,000	a 11,150	9,450
Mason and Barry	a 4,200	a 4,100	a 3,900	a 4,300	3,600	a 3,600
Seville	1,170	1,050	1,025	810	800	1,200
Other mines	4,805	4,300	3,400	3,050	3,120	3,550
Germany:						
Mansfeld	14,990	14,860	18,265	17,960	18,045	20,785
Other German ..	2,210	1,695	1,800	2,185	2,040	2,675
Austria	1,781	869	1,065	1,210	1,110	915
Hungary	310	239	205	445	430	590
Sweden	350	203	500	545	480	520
Norway	1,885	2,685	a 2,500	3,450	3,615	3,900
Italy	2,629	2,236	3,400	3,480	2,965	3,000
Russia	5,638	5,326	5,100	6,025	a 6,260	a 6,000
Total	82,474	83,128	88,216	89,938	87,960	91,552

a Estimated.

MINERAL RESOURCES.

The copper production of the world, 1889 to 1899, inclusive—Continued.

[Long tons.]

Country.	1894.	1895.	1896.	1897.	1898.	1899.
NORTH AMERICA.						
United States	158, 120	169, 917	205, 384	220, 571	235, 050	253, 870
Canada.....	1, 204	3, 923	4, 190	5, 938	8, 040	6, 731
Newfoundland	1, 900	1, 800	1, 800	1, 800	2, 100	2, 700
Mexico:						
Boleo	10, 370	10, 450	9, 940	10, 170	9, 435	10, 335
Other Mexican...	1, 400	1, 170	1, 210	<i>a</i> 4, 200	<i>a</i> 7, 000	<i>a</i> 9, 000
Total	172, 994	187, 260	222, 524	242, 679	261, 625	282, 636
SOUTH AMERICA.						
Chile.....	21, 340	22, 075	23, 500	21, 900	24, 850	25, 000
Bolivia:						
Corocoro	2, 300	2, 250	2, 000	2, 200	2, 050	2, 500
Peru	440	450	740	1, 000	3, 040	5, 165
Venezuela:						
New Quebrada...	2, 500					
Argentina	230	150	100	200	125	65
Total	28, 810	24, 925	26, 340	25, 300	30, 065	32, 730
AFRICA.						
Algiers		35			50	
Cape of Good Hope:						
Cape Company....	5, 000	5, 350	5, 470	5, 290	4, 660	4, 140
Namaqua Company	1, 500	1, 730	1, 980	2, 150	2, 400	2, 350
Total	6, 500	7, 115	7, 450	7, 440	7, 110	6, 490
ASIA.						
Japan	20, 050	18, 430	21, 000	23, 000	25, 175	27, 560
AUSTRALASIA.						
New South Wales	1, 847	3, 322	4, 467	6, 922	5, 743	<i>a</i> 5, 900
South Australia	4, 944	5, 251	4, 877	4, 705	<i>a</i> 4, 800	<i>a</i> 5, 000
Tasmania.....			1, 928	4, 956	<i>a</i> 6, 500	<i>a</i> 7, 000
Total	6, 791	8, 573	11, 272	16, 583	17, 043	17, 900

a Estimated.

COPPER.

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The copper production of the world, 1890 to 1899, inclusive.

RECAPITULATION.

[Long tons.]

Country.	1890.	1891.	1892.	1893.	1894.
Europe.....	79,952	80,751	84,648	82,922	82,474
North America.....	124,711	138,065	166,941	158,553	172,994
South America.....	33,960	29,015	29,015	27,320	26,810
Africa.....	6,570	6,120	6,120	6,090	6,500
Asia.....	17,972	18,500	19,000	18,000	20,050
Australasia.....	9,455	10,292	8,785	6,158	6,791
Total.....	272,620	282,743	314,509	299,043	315,619
Country.	1895.	1896.	1897.	1898.	1899.
Europe.....	83,128	88,216	89,938	87,960	91,105
North America.....	187,260	222,524	242,679	261,625	282,636
South America.....	24,925	26,340	25,300	30,065	32,730
Africa.....	7,115	7,450	7,440	7,110	6,490
Asia.....	18,430	21,000	23,000	25,175	27,560
Australasia.....	8,573	11,272	16,583	17,043	17,900
Total.....	329,431	376,802	404,940	428,978	458,421

THE ENGLISH COPPER TRADE.

Since England is one of the leading copper markets of the world, the following tables, showing the import and export movement, are of great interest:

British imports and exports of copper.

[Long tons.]

Year.	Imports of—		Total imports.	Exports.	Apparent English consumption.
	Bars, cakes, and ingots.	Copper in ores and furnace products.			
1860.....	13, 142	13, 715	26, 857	26, 117	.....
1865.....	23, 137	23, 922	47, 059	41, 398	.....
1870.....	30, 724	27, 025	57, 749	53, 006	.....
1871.....	33, 228	23, 671	56, 899	56, 633	.....
1872.....	49, 000	21, 702	70, 702	53, 195	.....
1873.....	35, 840	26, 756	62, 596	55, 716	.....
1874.....	39, 906	27, 894	67, 800	59, 742	.....
1875.....	41, 931	29, 483	71, 414	51, 870	.....
1876.....	39, 145	36, 191	75, 336	52, 468	.....
1877.....	39, 743	53, 582	93, 325	54, 088	.....
1878.....	39, 360	48, 212	87, 572	55, 001	.....
1879.....	46, 670	50, 421	97, 091	62, 412	30, 774
1880.....	36, 509	56, 225	92, 734	59, 482	32, 879
1881.....	32, 170	54, 057	86, 227	61, 689	31, 607
1882.....	35, 509	58, 366	93, 875	55, 683	42, 877
1883.....	35, 653	63, 493	99, 146	59, 350	40, 469
1884.....	39, 767	69, 623	109, 390	64, 691	51, 263
1885.....	41, 933	81, 616	123, 549	62, 080	54, 323
1886.....	42, 969	65, 046	108, 015	60, 511	41, 158
1887.....	29, 198	73, 891	103, 089	69, 453	53, 096
1888.....	44, 063	90, 867	135, 470	a 72, 066	42, 562
1889.....	b 38, 576	101, 407	139, 983	75, 627	65, 759
1890.....	c 49, 461	91, 788	141, 249	89, 747	66, 170
1891.....	44, 213	94, 403	138, 616	76, 056	59, 223
1892.....	d 35, 015	99, 356	134, 371	82, 542	e 48, 367
1893.....	41, 829	88, 003	129, 832	70, 986	66, 817
1894.....	56, 157	68, 851	125, 008	54, 689	f 50, 330
1895.....	42, 135	77, 806	119, 941	65, 990	f 50, 692
1896.....	60, 458	75, 398	135, 856	59, 334	f 76, 036
1897.....	60, 428	76, 127	136, 555	56, 542	f 69, 787
1898.....	67, 978	71, 726	139, 704	63, 370	f 69, 284
1899.....	58, 880	82, 730	141, 610	75, 271	f 60, 877

a Including 22,557 tons of Chile bars transferred to France.

b Including 1,166 tons of Chile bars transferred from France to England.

c Including 3,501 tons of Chile bars transferred from France to England.

d Including 3,585 tons of Chile bars transferred from France to England.

e Add 4,001 tons for comparison with former years, the difference arising from the new method of making up stock.

f Deducting copper contents of sulphate exported (13,078 tons in 1898 and 10,045 tons in 1899).

The following figures from the board of trade returns, supplemented by Messrs. James Lewis & Son, of Liverpool, for the last ten years show in detail the form in which the copper is brought into Great Britain and in what form it is exported:

Imports of copper into Great Britain from 1890 to 1899, inclusive.

[Long tons.]

Character.	1890.	1891.	1892.	1893.	1894.
Pure in pyrites.....	16,422	15,406	15,110	15,320	15,401
Pure in precipitate	25,562	29,326	28,444	24,968	24,878
Pure in ore	18,000	14,172	13,585	11,701	12,804
Pure in matte.....	31,803	35,499	42,217	35,994	15,767
Bars, cakes, etc.....	49,461	44,213	35,015	41,829	56,158
Total.....	141,248	138,616	134,371	129,832	125,008

Character.	1895.	1896.	1897.	1898.	1899.
Pure in pyrites.....	14,561	14,726	15,576	16,626	17,529
Pure in precipitate	26,508	23,160	25,932	21,558	24,387
Pure in ore	15,240	12,499	11,980	14,576	19,514
Pure in matte.....	21,497	25,013	22,639	18,966	21,300
Bars, cakes, etc.....	42,135	60,458	60,428	67,978	58,880
Total.....	119,941	135,856	136,555	139,704	141,610

The following table gives the details relating to the British imports of precipitate and matte:

Imports of precipitate and matte into Great Britain from 1889 to 1899, inclusive.

[Long tons.]

Country.	Fine copper.				
	1889.	1890.	1891.	1892.	1893.
Portugal and Spain ..	28,157	28,018	32,425	32,509	29,359
Chile	1,919	2,122	595	2,040	2,714
United States.....	26,581	18,897	19,109	24,668	20,700
Other countries.....	6,434	8,329	12,696	11,444	8,209
Total	63,091	57,366	64,825	70,661	60,982

Imports of precipitate and matte into Great Britain from 1889 to 1899, inclusive—Cont'd.

[Long tons.]

Country.	Fine copper.					
	1894.	1895.	1896.	1897.	1898.	1899.
Portugal and Spain ...	28,645	30,196	28,596	32,821	28,137	30,669
Chile	626	212	797	2,233	1,758	1,838
United States.....	2,133	8,337	10,016	5,259	2,181	354
Other countries.....	9,242	9,660	8,764	8,258	8,458	12,826
Total	40,646	48,405	48,173	48,571	40,534	45,687

Messrs. James Lewis & Son, of Liverpool, estimate as follows the imports of copper product in Liverpool, Swansea, and London during the years from 1887 to 1899, which represent the total imports, with the exception of precipitate into Newcastle and Cardiff, reliable returns of which can not be obtained, but which were estimated to vary from 8,000 to 10,000 tons fine per annum in former years, and in the last few years have been placed as high as 12,000 tons, but in 1898 and 1899 were reduced to 6,000 tons:

Imports of copper product into Liverpool, Swansea, and London.

[Long tons.]

Country.	1887.	1888.	1889.	1890.	1891.	1892.
Chile.....	20,008	24,479	22,070	22,909	14,378	17,619
United States	16,534	25,730	30,729	20,171	26,120	26,475
Spain and Portugal...	5,178	5,915	5,189	5,202	4,734	5,372
Spain and Portugal (precipitate).....	13,042	15,568	17,192	18,430	17,439	14,831
Spain and Portugal (pyrites)	14,940	15,448	16,097	16,422	15,406	15,110
Australasia	6,047	6,746	6,285	6,561	6,265	5,547
Cape of Good Hope...	8,271	8,829	11,507	9,927	7,452	8,092
Venezuela	2,261	3,574	4,299	5,245	5,017	5,028
Japan	200	4,469	2,523	10,674	7,852	4,989
Italy	1,055	1,058	1,043	953	649	725
Norway		545	234	80	30	38
Canada.....	94	156	181	264	189	120
Newfoundland	359	465	631	1,552	1,617	3,229
Mexico.....	61	158	3,938	3,325	3,616	869
Peru	13	202	271	254	279	287
Plata River.....	167	135	184	143	211	196
Other countries	1,074	4,054	1,389	225	236	1,245
Total tons fine..	89,304	117,531	123,762	122,337	111,490	109,772

Imports of copper product into Liverpool, Swansea, and London—Continued.

[Long tons.]

Country.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Chile.....	14,875	16,971	18,197	15,923	14,982	17,734	19,752
United States.....	35,647	30,495	17,098	39,676	32,792	38,979	20,773
Spain and Portugal...	5,674	4,674	3,288	6,298	7,697	7,293	7,084
Spain and Portugal (precipitate).....	10,296	10,642	12,612	11,474	17,386	15,664	16,847
Spain and Portugal (pyrites).....	15,320	15,401	14,561	14,726	15,576	16,626	17,529
Australasia.....	6,293	6,481	8,223	10,635	10,218	13,409	17,085
Cape of Good Hope...	5,472	6,112	6,524	5,905	7,575	9,381	7,076
Venezuela.....	1,434	2,327	360	107	21	.....	.....
Japan.....	2,370	3,299	4,258	3,492	3,654	2,086	7,812
Italy.....	1,091	763	283	418	100	177	157
Norway.....	.....	30	486	528	130	.....	182
Canada.....	50	105	.....	.....	127	.....	10
Newfoundland.....	2,265	1,279	3,244	2,467	2,484	1,359	2,044
Mexico.....	1,185	1,408	4,623	7,792	6,217	4,888	5,679
Peru.....	462	443	449	741	998	3,041	5,163
Plata River.....	160	229	148	94	190	124	63
Other countries.....	1,944	855	930	797	1,613	1,807	8,232
Total tons fine..	104,538	101,514	95,284	121,073	121,760	132,568	135,488

The quantities of copper in different forms imported to Great Britain and France from the United States are given in the following table:

Imports of copper into England and France from the United States.

[Long tons.]

Country.	1888.	1889.	1890.	1891.	1892.	1893.
England:						
Ore.....	298	349	5	4	18	23
Matte.....	20,752	26,581	18,897	19,109	24,668	20,700
Bars and ingots..	4,680	3,799	1,269	7,007	1,427	14,924
Total.....	25,730	30,729	20,171	26,120	26,113	35,647
France.....	6,496	1,058	1,733	8,329	4,340	12,483
United States into England and France	32,226	31,787	21,904	34,449	30,453	48,130
Chile into England and France.....	32,947	22,020	24,641	18,820	19,840	19,717

Imports of copper into England and France from the United States—Continued.

[Long tons.]

Country.	1894.	1895.	1896.	1897.	1898.	1899.
England:						
Ore	5					
Matte	2, 133	8, 337	10, 016	5, 259	2, 181	354
Bars and ingots..	28, 357	12, 250	29, 780	27, 591	36, 790	20, 739
Total.....	30, 495	20, 587	39, 796	32, 850	38, 971	21, 093
France	9, 248	11, 806	21, 998	26, 165	22, 753	24, 695
United States into England and France	39, 743	32, 393	61, 794	59, 015	61, 724	45, 788
Chile into England and France	20, 783	22, 161	22, 593	20, 842	24, 303	25, 482

The exports of copper from Great Britain, estimating the fine contents of alloys, have been as follows:

Exports of copper from Great Britain from 1888 to 1899, inclusive.

[Long tons.]

Character.	1888.	1889.	1890.	1891.	1892.	1893.
English, wrought and unwrought, and sheets.....	32, 058	48, 189	58, 571	51, 765	58, 518	45, 349
Yellow metal, at 60 per cent	4, 513	9, 195	10, 514	8, 547	8, 853	8, 745
Brass, at 70 per cent.	2, 650	3, 773	3, 721	3, 992	3, 783	4, 049
Total.....	39, 221	61, 157	72, 806	64, 304	71, 154	58, 143
Fine foreign	32, 845	14, 470	16, 941	11, 752	11, 388	12, 843
Total	72, 066	75, 627	89, 747	76, 056	82, 542	70, 986

Character.	1894.	1895.	1896.	1897.	1898.	1899.
English, wrought and unwrought, and sheets.....	34, 874	45, 299	38, 734	35, 951	40, 223	42, 992
Yellow metal, at 60 per cent	9, 514	8, 978	6, 773	6, 609	6, 172	4, 156
Brass, at 70 per cent.	3, 808	3, 747	4, 172	3, 936	3, 733	3, 994
Sulphate of copper..	10, 000	12, 000	13, 155	14, 844	13, 078	10, 045
Total	58, 196	70, 024	62, 834	61, 340	63, 206	61, 187
Fine foreign	6, 493	7, 966	9, 655	10, 046	13, 242	24, 129
Total	64, 689	77, 990	72, 489	71, 386	76, 448	85, 316

a Including 22,557 tons Chile bars transferred to France.

b Estimated.

Since 1894 the copper contents of sulphate exported have been introduced into the table.

THE FRENCH COPPER TRADE.

The direct imports of copper from different countries into France have been as follows for a series of years, according to Messrs. James Lewis & Son:

Direct imports into France from 1887 to 1899, inclusive.

[Long tons.]

Year.	Chile.	United States.	Mexico.	Other countries.	Total.
1887.....	9,011	3,910	.....	1,048	13,969
1888.....	8,468	6,496	2,700	6,905	24,569
1889.....	2,470	1,058	738	1,715	5,981
1890.....	2,803	1,733	.....	975	5,511
1891.....	4,442	8,329	.....	2,118	14,889
1892.....	2,221	4,340	2,515	2,208	11,284
1893.....	3,842	12,483	7,620	2,908	26,853
1894.....	3,812	9,248	6,299	1,588	20,947
1895.....	3,964	11,806	4,520	2,505	22,795
1896.....	7,030	21,998	3,627	3,700	36,355
1897.....	4,806	26,165	5,677	2,557	39,205
1898.....	6,612	22,753	5,722	2,350	37,437
1899.....	5,730	24,695	6,032	3,735	40,192

According to the French official statistics, the imports of bars, ingots, etc., have been as follows:

Imports of copper into France.

[Metric tons.]

Source.	1895.	1896.	1897.	1898.	1899.
England	8,250	5,596	3,884	5,970	8,650
Chile	3,494	4,573	2,804	4,469	4,442
United States.....	11,157	21,279	28,118	26,210	24,470
Other countries	11,717	12,197	14,830	10,712	13,650
Total	34,618	43,645	49,636	47,361	51,212

A comparison shows that there are striking discrepancies between the statistics collected by Messrs. James Lewis & Son and the official returns, which it seems difficult to harmonize. Messrs. Aron Hirsch & Sohn, of Halberstadt, Germany, in the annual statistical report, present the following as drawn from official sources:

French imports and exports of copper.

[Metric tons.]

	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Imports of bars, ingots, etc	30,398	28,654	34,618	43,646	49,636	47,361	51,212
Deduct exports ..	7,019	5,322	4,910	5,144	4,768	5,458	8,285
	23,379	23,332	29,708	38,502	44,868	41,903	42,927
Add old copper, excess of imports over exports	2,892	2,411	4,644	5,524	5,192	6,157	6,740
Supply ...	26,271	25,743	34,352	44,026	50,060	48,060	49,667

Imports and exports of ores, matte, etc.

[Metric tons.]

	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Imports	20,543	11,643	10,448	9,216	12,408	8,780	8,577
Exports	10,214	5,021	1,771	1,260	2,161	1,784	2,139
Supply ...	10,329	6,622	8,677	7,956	10,247	6,996	6,438

Messrs. Hirsch & Sohn, holding that the bulk of this material is rich, like Boleo mattes and Corocoro ores, estimate its contents at 70 per cent, and on this basis estimate the copper consumption of France as follows:

Copper consumption of France.

[Metric tons.]

	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Imports, raw material.....	26,271	25,743	34,352	44,026	50,060	48,060	49,667
Contents of ore...	7,230	4,635	6,074	5,570	8,685	7,024	6,004
Total.....	33,501	30,378	40,426	49,596	58,745	55,084	55,671
Increase (+) or decrease (-) of stocks.....	+355	+1,459	-103	-589	-379	-515	-670
Consumption.....	33,856	31,837	40,323	49,007	58,366	54,569	56,341

These figures are valuable as showing the very rapid increase in the consumption, slightly checked in 1898.

THE GERMAN COPPER TRADE.

German copper consumption has grown very rapidly. The following table, compiled by Messrs. Aron Hirsch & Sohn, of Halberstadt, shows the principal figures. There is included in the production the copper extracted in German metallurgical works from imported ores and mattes. An allowance is made for this in the table.

Copper consumption of Germany.

[Metric tons.]

	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Imports	44,514	51,806	52,504	59,742	73,123	82,903	89,772	89,746
Exports	9,817	11,304	10,406	10,893	12,452	12,568	14,957	20,304
Excess of imports	34,697	40,502	42,098	48,849	60,671	70,335	74,815	69,442
Production ...	25,406	24,011	25,857	26,013	29,489	29,468	30,704	^a 37,676
Total.....	60,103	64,513	67,955	74,862	90,160	99,803	105,519	107,118
Copper contents of imported copper ore and iron pyrites...	4,000	4,000	5,000	4,500	5,000	3,500	4,000	4,500
Home consumption.	56,103	60,513	62,955	70,362	85,160	96,303	101,519	102,618

^a Estimated.

The imports for 1899 include 70,094 tons of bars and ingots, 4,992 tons of coin and scrap, 1,397 tons copper contents old brass, 2,720 tons of copper from imported ores, and 10,543 tons from imported pyrites.

The source of the imports of bars and ingots for a series of years is shown in the following table, which proves how important a contributor to the German markets this country has become:

Source of German imports of ingot copper.

[Metric tons.]

Country.	1894.	1895.	1896.	1897.	1898.	1899.
Free port (Hamburg)	1,689	1,185	2,371	2,669	2,873	2,496
Belgium	356	356	115	9	216	19
France	303	152	81	268	121	93
Norway	128	362	71	45	32	1
Austria-Hungary....	50	197	11	9	12	105
Sweden	33	83	198	250	328	215
Switzerland.....	-----	-----	5	6	2	1
Spain	10	-----	10	41	69	31
England.....	7,430	7,363	7,478	8,660	12,754	14,350
Netherlands	109	139	73	18	19	184
United States	23,795	31,311	42,504	50,420	52,473	47,742
Japan	2,072	1,932	1,916	2,655	2,196	3,050
Chile.....	884	825	827	2,217	1,216	1,187
Australasia	-----	313	183	259	742	581
Other countries	173	147	271	46	25	39
Total.....	37,032	44,365	56,114	67,572	73,078	70,094

The production of Germany for a series of years has been as follows. The output of the Mansfeld Company is added, since that corporation is the dominating factor:

Copper production of Germany.

[Metric tons.]

Year.	Total production.	Production of Mansfeld.
1891.....	24,688	15,365
1892.....	25,406	15,588
1893.....	24,011	14,358
1894.....	25,857	15,217
1895.....	26,013	15,083
1896.....	29,489	18,541
1897.....	29,468	18,248
1898.....	30,704	18,335
1899.....	a 36,000	24,315

a Estimated.

It will be observed that Mansfeld considerably increased its production in 1896, and has made another leap forward in 1899.

A very notable fact in connection with the German copper trade is the rapid expansion in exports of copper manufactures, which reached a climax in 1899. Since 1893 the exports have more than doubled, as is shown by the following table:

Exports of copper manufactures from 1892 to 1899, inclusive.

[Metric tons.]

	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Rods and sheets....	4,507	4,889	5,009	4,700	5,429	5,712	5,369	4,869
Wire	2,565	3,052	4,433	3,975	5,909	6,175	5,930	7,578
Cables.....	1,526	1,957	2,193	3,713	7,631	8,119	10,432	11,481
Miscellaneous.....	492	563	501	556	279	245	263	548
Coarse forgings.....	1,902	2,050	2,538	2,643	2,648	2,703	2,988	3,162
Cartridges, caps, etc.	2,374	3,682	3,376	4,450	4,156	2,712	3,288	2,682
Fine copper goods..	3,234	3,859	4,117	4,912	7,837	7,425	8,454	9,855
Total	16,600	20,052	22,167	24,949	33,889	33,091	36,724	40,175

THE RUSSIAN COPPER TRADE.

The following table shows the consumption of copper in Russia, to which American producers contribute to some extent:

Copper consumption of Russia.

[Metric tons.]

	1892.	1893.	1894.	1895.	1896.	1897.	1898.
Imports of fine copper	7,803	12,340	10,442	11,033	14,090	15,280	14,458
Imports of manufactures.....	1,032	1,442	1,049	655	723	673	716
Production	4,901	5,436	5,730	5,413	5,721	6,596	6,500
Consumption	13,736	19,218	17,221	17,101	20,534	22,549	21,674

The production of the Russian mines during 1894, 1895, 1896, and 1897 was as follows, by districts:

Copper production in Russia.

[Poods.]

	1894.	1895.	1896.	1897.
Caucasus	150,000	145,805	149,698	162,534
Ural	155,000	149,032	166,205	192,839
Altai	17,000	12,568	13,240	15,427
Steppes district			1,868	3,586
Finland: Pitkaranda	27,500	20,274	18,000	18,000
Total	349,500	327,677	349,011	392,386
In metric tons (61 poods)	5,730	5,372	5,721	6,596

Summarizing the estimates of Messrs. Aron Hirsch & Sohn, we have the following as the copper consumption of the leading European countries:

Copper consumption of leading European countries.

[Metric tons.]

Country.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
England ...	96,615	90,069	91,184	115,557	110,210	105,816	88,624
Germany ..	60,513	62,955	70,349	85,371	96,385	101,518	102,618
France	33,856	31,837	40,323	49,007	58,366	54,569	56,341
Russia	19,218	17,221	17,101	20,534	22,549	21,674	23,000
Austria	14,901	16,457	15,735	16,498	18,288	20,599	18,770
Total ..	225,103	218,539	234,692	286,967	305,798	304,176	289,353

This is exclusive of the United States, whose consumption is estimated at 162,000 metric tons in 1899, based on the returns of the American Associated Companies, and neglecting stocks, a course which is justified by the absence of any reliable data on the subject.

THE LEADING FOREIGN PRODUCERS.

The high price of copper, brought about by the enormous expansion of the consumption and the very large profits earned by nearly every active mine in the world, has led to an eager reach for and a feverish development of new copper properties. The marked technical improvements in copper metallurgy have made much low-grade ore available for profitable treatment, so that deposits attract capital now which it would have been impossible to touch a decade ago. Notable progress

has been made in Canada and in Mexico. In South America there has been a revival of mining in Chile and in Bolivia, while the Cerro de Pasco district in Peru is looming up as a producer of international importance. In the Australian colonies there has been a very large production in recent years.

SPAIN.

The production of the Rio Tinto Company in 1899 was 34,817 long tons of copper, of which 20,230 tons were obtained by treatment at the mines and 14,587 tons were in the pyrites shipped. There were brought to market 32,099 tons in 1899, 32,095 tons in 1898, and 33,431 tons in 1897. In 1899 16,893 tons were sold as refined copper, 1,067 tons in the form of sulphate, and 14,139 tons in pyrites. The reserve heaps of the company are now estimated to contain 118,651 tons of fine copper.

The year was an exceedingly profitable one for the company, the profit from the sale of product having been £1,877,403, as compared with about £1,000,000 during the previous year. After putting aside £110,000 to reserve, writing off £72,000 for depreciation, paying £72,000 for administration, £66,580 for taxes, and £136,656 as interest on debentures, then £60,760 were applied to redemption of debentures and £78,540 as 5 per cent dividend on preference shares. Finally there were paid in dividends on the common stock £1,339,270, as compared with £850,417 during the preceding year.

The Tharsis Copper and Sulphur Company mined, in 1899, 572,854 tons of ore, as compared with 586,090 tons in 1898 and 565,949 tons in 1897, but the copper product fell from 11,147 long tons in 1898 to 9,448 tons in 1899. The shipments of pyrites were 403,679 tons. The product of the Tharsis has always been to some extent dependent upon the rainfall for leaching, but it is stated that the yield of the ore, too, is falling off. The company has therefore taken an option on another property. The net profits in 1899 were the largest in the history of the company, aggregating £478,878, the dividends paid being 37½ per cent on a capital of £1,250,000.

The old Mason and Barry, Limited, which controls the San Domingo mine in Portugal, is decreasing in importance as a copper producer. Its shipments of pyrites for sulphur value were 332,452 tons. The total profit was £95,440, and dividends of 25 per cent on £420,000 were paid, as compared with 12½ per cent in 1898.

AUSTRALASIA.

It is somewhat difficult to ascertain closely the copper product of Australasia, because the statistics of some of the colonies as to the metal output appear to be based on exports without being accompanied with estimates of fine copper contents of ore or of matte. Ore and furnace material, too, are forwarded for smelting and refining from one colony to the other.

So far as New South Wales is concerned, recent data are available through a monograph by Mr. J. E. Carne, entitled *The Copper Mining Industry and the Distribution of Copper Ores in New South Wales*, published by the Department of Mines and Agriculture.

Generally speaking, the copper miners of the colony, after having exhausted the upper belts of oxidized ores, seem to be facing the problem of economically treating the leaner sulphurets. In some districts the problem is complicated by the arid character of the country.

The most important district is that of Cobar, in the interior, where the leading producer is the Great Cobar Copper Mining Syndicate, a dividend-paying concern. In 1898 there were smelted 111,557 tons of ore, yielding 3,520 long tons of copper, an average of 3.24 per cent. Another company developing a promising property is the Cobar Chesney Copper and Gold Company.

South of this district, at Gidalmabone, is the Girilambone Copper Mining Company, Limited, which commenced smelting late in 1897, and during the first half of 1898 produced 215 long tons of copper from 2,371 tons of concentrates.

Another interior district is that in which the Nymagee is the principal property, having been a producer for a number of years. The greatest product was in 1884, when 2,207 long tons of copper were obtained by smelting ore which averaged 14.95 per cent. In 1898 17,152 tons of smelting material yielded 728 long tons of copper, or 4.53 per cent.

Farther south lies the Mount Hope district, where the two working mines are the New Mount Hope Company, which in 1898 produced 131 long tons of copper from 992 tons of ore, and the Great Central Company, which turned out 110 long tons from 1,100 tons of ore and concentrates.

Nearer the coast is a district with a number of producing mines, of which the Burruga is the largest. In 1898 the company raised 8,518 tons of ore, of which 5,678 tons were smelted, yielding 570 tons of copper. The Annandale, in the same district, resumed smelting on a small scale in 1898.

In the southern part of the colony are the Lake George Mines, Limited, at Captains Flat, where ores carrying the precious metals are handled, the copper merely being a carrier. During the first half of 1898 there were smelted 27,411 tons, producing a matte which contained 426 long tons of copper, 2,027 ounces of gold, and 70,379 ounces of silver.

A fair amount of copper is produced annually as an incidental product in treating the silver-lead ores of the famous Broken Hill district.

Nearly every one of the companies named has its small smelting plant; besides, there are customs smelters in and out of the colony which handle copper ores mined in New South Wales. The English

and Australian Copper Company, Limited, has a branch at Waratah, near Newcastle; the Smelting Company of Australia, Limited, treats copper ores at Lake Illawarra, near Dapto, New South Wales; the Great Cobar Copper Mining Syndicate has a refinery at Lithgow, New South Wales, and the works of Lewis Lloyd are at the same place. The Sulphide Corporation, Limited, at Cockle Creek, near Newcastle, originally established to treat complex lead ores from Broken Hill, has lately begun purchasing cupriferous material and has handled some South American ores. Outside smelters are the Australian Smelting Company, Limited, at Dry Creek Station, South Australia, and the Wallaroo Smelting Works, Wallaroo, South Australia.

Tasmania has come forward in recent years as one of the most interesting of the newer contributors to the copper supply, very large undertakings having been developed in the Mount Lyell field, both by British and by Australian capital. A large number of companies have been formed and a considerable increase in the production is likely. The district appears to furnish a variety of ores, some of them being pyritic, while others are siliceous. The leading concern is the Mount Lyell Mining and Railway Company, which owns the railway to the coast, mines almost entirely by open cut, and treats the ore in a large smelting plant. During the half year ending March 31, 1900, there were smeltered 150,735 tons of Mount Lyell ores and 18,736 tons of purchased ores, 4,028 tons of flue dust, 28,139 tons of first matte, 4,744 tons of converter slags, and 723 tons of converter linings, the product being 9,868 tons of matte. The latter yielded in the converters blister copper containing 4,742 tons of fine copper, 387,490 ounces of silver, and 14,605 ounces of gold. Including purchased ores, the ore yielded 2.81 per cent of copper, 2.30 ounces of silver, and 0.09 ounces of gold per ton; thus illustrating that it is a low-grade proposition, the successful operation of which is possible only through modern methods. The total receipts were £394,813, while the expenditures were £260,518, leaving a gross profit of £134,295. Dividends aggregating £123,750 were paid on an issued capital of 275,000 £3 shares.

The second large corporation is the North Mount Lyell Company, which has opened up a very large body of siliceous ore, estimated to contain 12 per cent of copper and 5 ounces of silver per ton. Smelting works are now being built to handle the ore. The same interests which control the North Lyell hold the South Lyell, the Lyell Comstock, Tasman Lyell, and Crown Lyell, which are to join in the erection of a second smelting plant.

Queensland, which has not yet produced any copper, is reported to possess very extensive deposits, some of which are now being developed. The most conspicuous of these are in the back country, reached through the port of Cairns, under the control of the Chillagoe Company, whose Mungana and Redcap mines are the largest. The ore is low in grade, but carries some silver. To reach the mines a railroad

over 100 miles long will have to be built. Six furnaces are approaching completion, which are to treat 3,000 to 4,000 tons per week. Farther inland is the Einasleigh group, where a reduction plant is also under way. Sixty miles from Chillagoe is the Mount Garnet mine, with a deposit of ore rather higher both in copper and in silver. There, too, smelting works are being erected. Development is proceeding also in the Rockhampton district, where furnaces are being erected.

South Australia continues a steady producer of copper, its exports of ingot having been 4,705 long tons in 1897 and 4,771 tons in 1898. The metal is obtained chiefly from mines in Yorkes Peninsula.

CANADA.

There has been only a moderate increase in the copper production of Canada, the official statistics showing a total output of 15,078,475 pounds fine for 1899. Of this about one-half—7,772,591 pounds—was produced in British Columbia in 1899 as compared with 7,271,678 pounds in 1898. The official returns make the copper product of Ontario 5,668,000 pounds, apparently all from the Sudbury nickel-copper ores. A considerable part of the ores of the Kootenai district is smelted at Northport, Washington. On Texada Island the Van Anda Company has produced some copper.

MEXICO.

Mexico's production is difficult to arrive at. The principal concern is the Boleo Company of Lower California, whose product for 1899 is given at 10,335 long tons. In recent years capitalists from the United States identified with the copper industry have taken an active interest in the development of the copper resources of the country. Guggenheim Brothers have built a smelting plant at Aguas Calientes, and Phelps, Dodge & Co. are completing a very comprehensive establishment at Nacosari, Sonora, under the name of the Moctesuma Copper Company. Lewisohn Brothers are also developing property. Besides this considerable quantities of cupriferous material are treated at the El Paso plant of the American Smelting and Refining Company, and at the Silver City Reduction Works. Reports from refiners and smelters in the United States show that in 1899 they handled 7,275,753 pounds of copper derived from Mexican sources. It is understood also that European capitalists are investing heavily in opening up the Iguaran property in Michoacan.

AFRICA AND NEWFOUNDLAND.

In Cape Colony the Cape Copper Company and the Namaqua Copper Company remain the only active producers. The former has interests not only in Africa, but also in Newfoundland. For many

years the Ookiep mine, with its rich ores, has been the mainstay of the company. During the last fiscal year it produced 24,262 net tons, averaging 18.5 per cent, while the Spektakel mine yielded 932 tons of 32 per cent. The reserves of the former mine are placed at 24,000 tons of 21 per cent ore undiminished by the year's working. A new property is being developed in the Nababeep mine, with large reserves of low-grade ore. The profit-and-loss account of the Cape Company shows a credit balance of £485,287, including £153,301 brought forward from the previous year. Out of this £207,000 were paid in dividends. The net profit earned by the Tilt Cove property in Newfoundland was £47,353. The production of these mines in 1899 was 62,138 tons of 3.5 per cent ore from the Tilt Cove and 3,699 tons of 11 per cent ore from the West mine.

The Namaqua Copper Company, Limited, produced in 1899 about 9,000 tons of shipping ore, averaging about 25 per cent of copper. The net profit was £115,384, out of which £75,200 were paid in dividends and £20,000 were set aside to provide funds for a new railroad. It is proposed to treat the low-grade ore locally.

PERU.

Peru promises to come to the front rapidly as a producer of copper. Reports of the character and extent of the deposits in the Cerro de Pasco district and of the vigorous manner in which they are being developed justify this belief.

LEAD.

By CHARLES KIRCHHOFF.

INTRODUCTION.

The production of lead in the United States in 1899 did not reach the record production of 1898, when it attained 222,000 short tons. Had it not been for the smelters' strike in Colorado and the stoppage of some of the important mines of the Cœur d'Alene district in Idaho, it would probably have outstripped the maximum attained during the previous year. As it was, the output from domestic ores is estimated to have attained 210,500 short tons. The mines of the district of southwestern Missouri and southeastern Kansas, too, fell behind their record.

The most active preparations for development have been progressing in southeastern Missouri, but, with the leaner ores of that section, considerable preparation is required in prospecting with the drill, in opening up proven territory, and in putting down mining and concentrating plants, before notable additions to the metal output can be attained.

PRODUCTION.

The following series of tables present the figures of the total gross production of lead in the United States from 1825. Up to the year 1882 the figures have been compiled from the best data available. Since 1882 the statistics are those collected by this office, with the exception of the year 1889, when they were gathered by the Census Office:

Production of refined lead in the United States from 1825 to 1872, inclusive.

Year.	Production.	Year.	Production.	Year.	Production.
	<i>Short tons.</i>		<i>Short tons.</i>		<i>Short tons.</i>
1825	1,500	1836	15,000	1843	25,000
1830	8,000	1837	13,500	1844	26,000
1831	7,500	1838	15,000	1845	30,000
1832	10,000	1839	17,500	1846	28,000
1833	11,000	1840	17,000	1847	28,000
1834	12,000	1841	20,500	1848	25,000
1835	13,000	1842	24,000	1849	23,500

Production of refined lead in the United States from 1825 to 1872, inclusive—Cont'd.

Year.	Production.	Year.	Production.	Year.	Production.
	<i>Short tons.</i>		<i>Short tons.</i>		<i>Short tons.</i>
1850	22,000	1858	15,300	1866	16,100
1851	18,500	1859	16,400	1867	15,200
1852	15,700	1860	15,600	1868	16,400
1853	16,800	1861	14,100	1869	17,500
1854	16,500	1862	14,200	1870	17,830
1855	15,800	1863	14,800	1871	20,000
1856	16,000	1864	15,300	1872	25,880
1857	15,800	1865	14,700		

The sources from which the lead which comes into the market are drawn are numerous, and since the metal passes through a number of channels from the ore, the complications are serious.

We have, first, the lead produced from the nonargentiferous ores of southeast Missouri, the bulk of which is treated in smelting works controlled and owned by the mining companies themselves. This is a directly marketable product. A part of the ores and some furnace material are purchased by outside smelters, chiefly those of the St. Louis district, although at times Eastern desilverizers have drawn upon the district for smelting material.

Second, there are the lead ores raised in the zinc-lead mines of southwest Missouri and southeast Kansas, known as the Joplin-Galena district. A part of these is smelted in local works, one of them, however, marketing a certain quantity of metal annually in the form of a pigment. In Iowa a small quantity of lead ore is also smelted locally, being the product of the Dubuque district.

The lead thus obtained is directly marketable, being practically free from silver. It is known as "soft lead." In the tables of production this also includes a small amount of lead from Virginia, to which, at times, lots of metal produced in Tennessee have been added.

In former years there were some Scotch hearths in Wisconsin to treat local ores, but they have suspended work for many years.

A growing percentage of the ores of southwest Missouri and southeast Kansas, and of Wisconsin, Iowa, and Illinois, is purchased by desilverizers, by whom it is used in connection with the production of hard lead, and by lead smelters as a carrier for silver. The "soft lead" does not, therefore, represent the entire output to be credited to the Mississippi Valley.

By far the greatest quantity of lead, however, is obtained by the smelting of argentiferous lead ores mined in the Rocky Mountain region in mixture with ores of the precious metals free from lead, so-called "dry ores," which lead smelters can handle more economically than

they can be treated locally by amalgamation or by other processes used for the extraction of gold and silver. Practically the lead in these ores has become the carrier for the precious metals in the "dry" ores, and, generally speaking, it may be stated that the offerings of "dry" ores have usually been so heavy for many years that suitable lead ores always find eager buyers. There are a few lead smelting plants, relatively unimportant, in Idaho, Montana, New Mexico, and California, built to reduce the ores locally mined. The great mass of the ores, however, are hauled often great distances to meet the fuel and to encounter ores carrying the precious metals. The principal large plants are in Colorado, Utah, and Montana. An excellent illustration of this movement is afforded by the famous Cœur d'Alene district in Idaho, which yields over one-quarter of the lead mined in the United States. Not a pound is smelted locally, the concentrates and ore being shipped for reduction to the smelters in Colorado, Montana, Utah, Nebraska, Illinois, and the Puget Sound.

From 1873 to 1885, inclusive, the production was separated into the two groups, that of desilverized lead obtained from smelting argentiferous ores drawn from the Rocky Mountain region and that of the "soft lead" from the nonargentiferous ores of the Mississippi Valley.

Production of refined lead in the United States from 1873 to 1885.

Year.	Total production. (a)	Desilverized lead. (a)	Soft lead. (b)	Net American product.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1873.....	42,540	20,159	22,381	42,540
1874.....	52,080			52,080
1875.....	59,640	34,909	24,731	59,640
1876.....	64,070	37,649	26,421	64,070
1877.....	81,900	50,748	31,152	81,900
1878.....	91,060	64,290	26,770	91,060
1879.....	92,780	64,650	28,130	92,780
1880.....	97,825	70,135	27,690	97,825
1881.....	117,085	86,315	30,770	117,085
1882.....	132,890	103,875	29,015	132,890
1883.....	143,957	122,157	21,800	143,957
1884.....	139,897	119,965	19,932	139,897
1885.....	129,412	107,437	21,975	129,412

a Including foreign base bullion refined in bond.

b Including a small quantity of lead produced in the Southern States.

In 1886, however, another source of lead began to assume importance and became a factor, introducing further complications. The smelters of the Rocky Mountain regions, some of the desilverizers, and a number of border plants began to draw largely, first upon Mexico, and later upon British Columbia, for growing quantities of

argentiferous lead ores. Before the advent of these supplies the product of the American mines was easily arrived at by adding together the desilverized and the soft lead. From 1886 on the third table was prepared, and for a series of years the lead production was held to be the total output, deducting the lead contents of the foreign ores smelted.

Later on the refining in bond of foreign base bullion became an important industry. Varying quantities of the metal so produced were retained in this country for home consumption. A certain quantity was "exempt" from payment of duty as representing the metallurgical loss, and varying amounts are entered for domestic consumption by the payment of duty. The overlapping of receipts and shipments from one year to the other and the time required for the completion of the treatment of the material to the marketable product introduced uncertainties which rendered unreliable the simple and direct method of deducting from the total product of refined lead the estimated lead contents of the foreign material imported during the year.

Since it was also deemed highly desirable to ascertain as closely as possible the source, territorially, of our home product, the system was adopted of ascertaining through the smelters the quantities of lead in the ores worked by them from different States and Territories. From these returns the estimates of the domestic product have been made which appear in the following table in the last column, the system having been adopted in 1894:

Production of refined lead in the United States from 1886 to 1899.

Year.	Total production. (a)	Desilverized lead. (a)	Soft lead. (b)	From foreign ores and base bullion.	Net American product.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1886.....	135,629	114,829	20,800	c 5,000	c 130,629
1887.....	160,700	135,552	25,148	c 15,000	c 145,700
1888.....	180,555	151,465	29,090	28,636	151,919
1889.....	182,967	153,709	29,258	26,570	156,397
1890.....	161,754	130,403	31,351	18,124	143,630
1891.....	202,406	171,009	31,397	23,852	178,554
1892.....	213,262	181,584	31,678	39,957	173,305
1893.....	229,333	196,820	32,513	65,351	163,982
1894.....	219,090	181,404	37,686	59,739	d 162,686
1895.....	241,882	201,992	39,890	76,173	d 170,000
1896.....	264,994	221,457	43,537	77,738	d 188,000
1897.....	291,036	247,483	43,553	83,671	d 212,000
1898.....	310,621	267,842	42,779	99,945	d 222,000
1899.....	304,392	263,826	40,566	95,926	d 210,500

a Including foreign base bullion refined in bond.

b Including a small quantity of lead produced in the Southern States.

c Estimated.

d Arrived at from direct returns from smelters.

Hard lead.—Since 1891 special returns from desilverizers have been made on the quantity of antimonial or hard lead produced. The quantity was 4,043 tons in 1891, 5,039 tons in 1892, and 5,013 tons in 1893. In 1896 the production of hard lead was 7,507 tons, rising to 8,867 tons in 1897, and declining again to 8,473 tons in 1898. It amounted to 6,345 tons in 1899.

SOURCES OF LEAD.

Since 1894, through the courteous cooperation of the lead smelters and refiners, returns have been received showing the lead contents of the ores smelted by them, whether from domestic or from foreign ores. In 1899 some complications were created by the formation of the American Smelting and Refining Company. For some of the works which became properties of the new company figures were only available which covered the first year of its operations, from May, 1899, to May, 1900. The totals given in the table for the year 1899 do not in all cases cover the calendar year, and therefore are not exact as to that period. They are presented, however, as being the best available under the circumstances.

Lead contents of ores smelted by the works in the United States.

State or Territory.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Colorado	50,613	46,984	44,803	40,576	57,352	70,308
Idaho	33,308	31,638	46,662	58,627	59,142	52,154
Utah	23,190	31,305	35,578	40,537	39,299	29,987
Montana	9,637	9,802	11,070	12,930	10,745	10,227
New Mexico	2,973	3,040	3,461	9,123	5,797	4,856
Nevada	2,254	2,583	1,173	959	4,714	3,388
Arizona	1,480	2,053	1,165	2,184	2,224	3,377
California	478	949	691	383	482	487
Washington, Oregon, Alaska, South Da- kota, Texas	150	381	1,006	638	1,349	862
Missouri, Kansas, Wis- consin, Illinois, Iowa, Virginia	46,300	53,596	51,887	56,542	54,469	54,444
Total lead con- tents Ameri- can ores smelted	170,383	182,331	197,496	222,499	235,573	230,090
Contents Mexican ores	} α 21,000	16,437	15,403	13,430	10,520	10,293
Contents Canadian ores		5,040	10,100	19,515	17,377	5,110
Contents miscellane- ous or unknown			2,118	344	428	772

α Estimated.

The figures presented for Missouri, Kansas, etc., are an aggregate of two sets of returns, one the pig lead made by local smelters and works in the St. Louis district, usually reported as "soft lead," and the other the lead contents of ores, concentrates, and furnace products purchased by desilverizing works and by smelters of argentiferous ores, according to the returns the second smelted material carrying 13,878 short tons of lead.

In view of the fact that the smelter returns do not all cover the same period, they can not well be used for the year 1899, as the basis for the United States production, by the method usually adopted by this office since it first became necessary to resort to it in 1894. From a study of the detailed figures available, an estimate of 210,500 short tons as the product of the lead mines of the United States has been accepted.

DOMESTIC PRODUCERS.

In spite of the fact that the majority of the largest smelting works in Colorado were closed down for two months in 1899, as the result of a strike, the lead product credited to the State shows a very important increase. This has been chiefly due to a larger output in the Leadville district and at Aspen.

Idaho suffered a decline, largely because of labor troubles, which led to the blowing up of the large concentrating plant of the Bunker Hill and Sullivan Company.

Utah has not come up to its usual tonnage.

A great deal of activity has been displayed in extending the older mines of southwest Missouri and in developing new territory. Interests identified with smelting in other sections and with lead manufactures have entered the field.

The St. Joseph Lead Company, of Bonneterre, by far the largest producer, has started two new shafts in Big River west of Desloge.

The Doe Run Lead Company has put down its No. 4 shaft. The Central Lead Company at Flat River has made general betterments and has had the benefit of the new Thatcher shaft. The same interests have formed the Penicant Lead Company, having acquired lands at Bonneterre.

In southeast Washington County the Renault Lead Company is working the old Palmer mines much more systematically than ever before, and it is likely that the production, greater than in its best days, will become regular. Two new air furnaces have been added, making five in all, this company being the only one in Missouri which is running air furnaces regularly.

The most comprehensive recent undertaking is that of the National Lead Company, operating under the title of the St. Louis Smelting and Refining Company, all of whose stock it controls. Two shafts

have been sunk, and a concentrating mill, to have an ultimate capacity of 1,000 tons of rock per day, is being built. A part of this plant was started in 1900.

Interests identified with the Guggenheim Brothers have formed the Federal Lead Company, which has purchased the old Leadington property and the plant of the Missouri Smelting Company near St. Louis.

In 1899 the Columbia Lead Company finished its shaft, and a second one has been sunk. Early in January, 1900, this company started the concentrating mill, which is producing an average of 25 tons of concentrates daily, and this is to be doubled. The concentrates are being shipped to the Missouri Smelting Company at St. Louis, and to plants at Argentine, Kansas, Newark, and Pittsburg. The same interests, the Catharine Lead Company, of Fredericktown, are developing a property immediately adjoining the Mine La Motte, in Madison County, and are completing a concentrating mill capable of treating 200 tons of rock per day. For the purpose of smelting the concentrates of the Columbia and Catharine companies, a plant is being built to be known as the Continental Smelting Company. Mr. H. J. Cantwell is the leading spirit in these enterprises.

In 1899 the Derby Lead Company started two shafts, but have not as yet begun on a mill.

Exploration and development are going on in connection with a number of other properties. Thus, George Cole, of Farmington, Missouri, and associates are sinking a shaft at Irondale, Missouri, to reach ore deposits proved by very extensive diamond drilling. The ore zone is 48 feet thick at the shaft. Preparations are being made to build a mill to handle 200 tons of rock per day, with motive power enough to take care of double the quantity. It is expected that the product will be about 20 tons of concentrates per twenty-four hours, with 65 to 70 per cent of lead. The company is to be known as the Irondale Lead Company.

A similar plant will be opened by the same interests to develop ground proved by drilling at Fredericktown, Madison County. The company has been organized under the laws of Delaware, under the title of the Great Western Lead Company.

The Elizabeth Lead Company and the Standard Lead Company are also drilling, the latter at Big River.

The Joplin-Galena district showed a falling off in 1899, the total sales being reported as 23,953 tons in that year as compared with 26,475 short tons in 1898 and 29,578 short tons in 1897. Among the leading camps Joplin declined from 8,329 short tons of lead ore in 1898 to 6,513 tons in 1899; Galena, from 7,878 tons in 1898 to 7,083 tons in 1899, and Duenweg from 2,194 tons in 1898 to 1,272 tons in 1899. Carterville increased from 4,246 tons in 1898 to 5,193 short tons in 1899.

The local smelters, the Picher Lead Company, the Granby Mining and Smelting Company, J. B. Serage, the Case Lead Company, and the Galena-Empire Lead Smelting Company produced 7,663 short tons of lead in 1899 as compared with 6,869 tons in 1898 and 6,975 tons in 1897.

CONSUMPTION.

Based on the data at hand, the following estimate is presented of the consumption of lead in recent years. The figures representing domestic stocks are aggregates of returns received by this office. They are not, however, complete:

Estimate of the consumption of lead in the United States from 1894 to 1899.

	1894.	1895.	1896.	1897.	1898.	1899.
Supply—						
Total product desilverized lead.....	<i>Short tons.</i> 181,404	<i>Short tons.</i> 201,992	<i>Short tons.</i> 221,457	<i>Short tons.</i> 247,483	<i>Short tons.</i> 267,827	<i>Short tons.</i> 263,826
Soft lead.....	37,686	39,890	43,537	43,553	42,779	40,566
Imports, foreign refined..	8,200	22,947	2,020	2,000	437	215
Stock, domestic, beginning of year.....	7,496	8,586	9,557	9,299	17,608	.....
Stock, foreign in bond, beginning of year.....	3,302	7,181	9,865	4,124	6,691	7,341
Total supply.....	238,088	280,596	286,436	306,459	335,342	311,948
Deduct—						
Foreign base bullion and ores refined in bond and exported.....	29,000	18,130	57,612	62,409	84,666	73,313
Lead in manufactures exported under drawback.....	950	2,000	1,500	500	1,200	1,000
Stock, domestic, close of year.....	8,586	9,557	9,299	17,608	14,683	.....
Stock, foreign in bond...	7,181	9,865	4,124	6,694	7,341	11,320
Total.....	45,717	39,552	72,535	87,211	107,890	85,633
Consumption.....	192,371	241,044	213,901	219,248	227,452	226,315

During the year 1899 no figures have been collected on domestic stocks. The apparent home consumption was nearly as heavy as that of the previous year.

IMPORTS AND EXPORTS.

The following tables are from the records of the Bureau of Statistics:

Lead imported and entered for consumption in the United States, 1867 to 1899.

Year ending—	Ore and fross.		Pigs and bars.	
	Quantity.	Value.	Quantity.	Value.
June 30—	<i>Pounds.</i>		<i>Pounds.</i>	
1867.....	611	\$25	65,322,923	\$2,812,668
1868.....	6,945	239	63,254,677	2,668,915
1869.....			87,865,471	3,653,481
1870.....	5,973	178	85,895,724	3,530,837
1871.....	316	10	91,496,715	3,721,096
1872.....	32,231	1,425	73,086,657	2,929,623
1873.....			72,423,641	3,233,011
1874.....			46,205,154	2,231,817
1875.....	13,206	320	32,770,712	1,559,017
1876.....			14,329,366	682,132
1877.....	1,000	20	14,583,845	671,482
1878.....			6,717,052	294,233
1879.....			1,216,500	42,983
1880.....			6,723,706	246,015
1881.....	5,981	97	4,322,068	159,129
1882.....	21,698	500	6,079,304	202,603
1883.....	600	17	4,037,867	130,108
1884.....	419	13	3,072,738	85,395
1885.....	4,218	57	5,862,474	143,103
1886.....	715,588	9,699	17,582,298	491,310
December 31—				
1887.....	153,731	21,487	7,716,783	219,770
1888.....	88,870	2,468	2,582,236	69,891
1889.....	328,315	7,468	2,773,622	76,243
1890.....	11,065,865	504,067	19,336,233	593,671
1891.....	40,692,478	1,120,067	3,392,562	104,184
1892.....	54,249,291	1,278,114	1,549,771	110,953
1893.....	58,487,319	1,004,295	3,959,781	129,290
1894.....	33,020,250	437,999	39,168,529	895,496
1895.....	45,050,674	687,222	109,551,082	2,052,209
1896.....	37,829,583	631,381	10,551,148	191,479
1897.....	31,036,882	535,094	16,050,987	314,549
1898.....	16,610,607	331,116	311,502	8,787
1899.....	6,824,556	125,344	3,473,252	78,062

Lead imported and entered for consumption in the United States, etc.—Continued.

Year ending—	Sheets, pipe, and shot.		Shot.		Not otherwise specified.	Total value.
	Quantity.	Value.	Quantity.	Value.		
June 30—	<i>Pounds.</i>		<i>Pounds.</i>			
1867.....	185,825	\$9,560			\$6,222	\$2,828,475
1868.....	142,137	7,229			6,604	2,682,987
1869.....	307,424	15,531			18,885	3,687,897
1870.....	141,681	6,879			10,444	3,548,336
1871.....	86,712	4,209			8,730	3,734,045
1872.....	15,518	859			20,191	2,952,098
1873.....	105	12	420	\$50	21,503	3,254,576
1874.....			30,219	1,349	36,484	2,269,650
1875.....			58	4	25,774	1,585,115
1876.....			20,007	1,204	27,106	710,442
1877.....			16,502	1,242	1,041	673,785
1878.....			15,829	963	113	295,309
1879.....			3,748	209	930	44,122
1880.....			1,120	54	371	246,440
1881.....			900	65	1,443	160,734
1882.....			1,469	99	2,449	205,651
1883.....			1,510	79	8,030	138,234
1884.....	15,040	630			1,992	88,030
1885.....	971,951	22,217			1,372	166,749
1886.....	27,357	1,218			964	503,191
December 31—						
1887.....	27,941	1,286			302	242,845
1888.....	23,103	1,202			977	74,538
1889.....	35,859	1,417			1,297	86,425
1890.....	91,660	5,591			1,136	1,104,465
1891.....	334,179	12,406			604	1,237,467
1892.....	90,135	6,207			2,063	1,397,337
1893.....	59,798	2,955			1,691	1,138,231
1894.....	44,080	2,050			536	1,336,081
1895.....	128,008	5,030			1,277	2,745,738
1896.....	96,010	3,818			644	827,322
1897.....	95,891	4,042			513	854,198
1898.....	242,759	9,389			312	349,604
1899.....	110,372	4,402			8,626	216,434

*Old and scrap lead imported and entered for consumption into the United States,
1867 to 1889.*

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
June 30—	<i>Pounds.</i>		June 30—	<i>Pounds.</i>	
1867.....	1, 256, 233	\$53, 202	1880.....	213, 063	\$5, 262
1868.....	2, 465, 575	101, 586	1881.....	123, 018	2, 729
1869.....	2, 983, 272	123, 068	1882.....	220, 702	5, 949
1870.....	3, 756, 785	150, 379	1883.....	1, 094, 133	31, 724
1871.....	2, 289, 688	94, 467	1884.....	160, 356	4, 830
1872.....	4, 257, 778	171, 324	1885.....	4, 866	106
1873.....	3, 545, 098	151, 756	December 31—		
1874.....	395, 516	13, 897	1886.....	24, 726	882
1875.....	382, 150	13, 964	1887.....	136, 625	4, 323
1876.....	265, 860	9, 534	1888.....	33, 100	904
1877.....	249, 645	8, 383	1889.....	50, 816	1, 494
1878.....	106, 342	3, 756	1890.....	(a)	(a)
1879.....	42, 283	1, 153			

a Included in pigs and bars after 1889.

Lead, and manufactures of lead, of domestic production, exported from the United States.

Year ending—	Manufactures of—			Pigs, bars, and old.		Total value.
	Lead.		Pewter and lead.			
	Quantity.	Value.	Value.	Quantity.	Value.	
September 30—	Pounds.			Pounds.		
1790.....	13, 440	\$810				\$810
1803.....	a 900					
1804.....	19, 804					
1805.....	8, 000					
1808.....	40, 583					
1809.....	126, 537					
1810.....	172, 323					
1811.....	65, 497					
1812.....	74, 875					
1813.....	276, 940					
1814.....	43, 600					
1815.....	40, 245					
1816.....	35, 844					
1817.....	111, 034	9, 993				9, 993
1818.....	281, 168	22, 493				22, 493

a Barrels.

MINERAL RESOURCES.

Lead, and manufactures of lead, of domestic production, exported, etc.—Continued.

Year ending—	Manufactures of—			Pigs, bars, and old.		Total value.
	Lead.		Pewter and lead.			
	Quantity.	Value.	Value.	Quantity.	Value.	
September 30—	<i>Pounds.</i>			<i>Pounds.</i>		
1819.....	94,362	\$7,549				\$7,549
1820.....	25,699	1,799				1,799
1821.....	56,192	3,512				3,512
1822.....	66,316	4,244				4,244
1823.....	51,549	3,098				3,098
1824.....	18,604	1,356				1,356
1825.....	189,930	12,697				12,697
1826.....	47,337	3,347	\$1,820			5,167
1827.....	50,160	3,761	6,183			9,944
1828.....	76,882	4,184	5,545			9,729
1829.....	179,952	8,417	5,185			13,602
1830.....	128,417	4,831	4,172			9,003
1831.....	152,578	7,068	6,422			13,490
1832.....	72,439	4,483	983			5,466
1833.....	119,407	5,685	2,010			7,695
1834.....	13,480	805	2,224			3,029
1835.....	50,418	2,741	433			3,174
1836.....	34,600	2,218	4,777			6,995
1837.....	297,488	17,015	3,132			20,147
1838.....	375,231	21,747	6,461			28,208
1839.....	81,377	6,003	12,637			18,640
1840.....	882,620	39,687	15,296			54,983
1841.....	2,177,164	96,748	20,546			117,294
1842.....	14,552,357	523,428	16,789			540,217
June 30—						
1843 (a).....	15,366,918	492,765	7,121			499,886
1844.....	18,420,407	595,238	10,018			605,256
1845.....	10,188,024	342,646	14,404			357,050
1846.....	16,823,766	614,518	10,278			624,796
1847.....	3,326,028	124,981	13,694			138,675
1848.....	1,994,704	84,278	7,730			92,017
1849.....	680,249	30,198	13,196			43,394
1850.....	261,123	12,797	22,682			35,479
1851.....			16,426	229,448	\$11,774	28,200
1852.....			18,469	747,930	32,725	51,194

a Nine months.

Lead, and manufactures of lead, of domestic production, exported, etc.—Continued.

Year ending—	Manufactures of—			Pigs, bars, and old.		Total value.
	Lead.		Pewter and lead.			
	Quantity.	Value.	Value.	Quantity.	Value.	
June 30—	<i>Pounds.</i>			<i>Pounds.</i>		
1853.....			\$14,064	100,778	\$5,540	\$19,604
1854.....			16,478	404,247	26,874	43,352
1855.....			5,233	165,533	14,298	19,531
1856.....			5,628	310,029	27,512	33,140
1857.....			4,818	870,544	58,624	63,442
1858.....			27,327	900,607	48,119	75,446
1859.....			28,782	313,988	28,575	57,357
1860.....			56,081	903,468	50,446	106,527
1861.....			30,534	109,023	6,241	36,775
1862.....			28,832	79,231	7,334	36,166
1863.....			30,609	237,239	22,634	53,243
1864.....			30,411	223,752	18,718	49,129
1865.....			29,271	852,895	132,666	161,937
1866.....			44,483	25,278	2,323	46,806
1867.....			27,559	99,158	5,300	32,859
1868.....			37,111	438,040	34,218	71,329
1869.....			17,249			17,249
1870.....		\$28,315				28,315
1871.....		79,880				79,880
1872.....		48,132				48,132
1873.....		13,392				13,392
1874.....		302,044				302,044
1875.....		429,309				429,309
1876.....		102,726				102,726
1877.....		49,835				49,835
1878.....		314,904				314,904
1879.....		280,771				280,771
1880.....		49,899				49,899
1881.....		39,710				39,710
1882.....		178,779				178,779
1883.....		43,108				43,108
1884.....		135,156				135,156
1885.....		123,466				123,466
December 31—						
1886.....		136,666				136,666

Lead, and manufactures of lead, of domestic production, exported, etc.—Continued.

Year ending—	Manufactures of—			Pigs, bars, and old.		Total value.
	Lead.		Pewter and lead.	Quantity.	Value.	
	Quantity.	Value.	Value.			
December 31—	Pounds.			Pounds.		
1887.....		\$140,065				\$140,065
1888.....		194,216				194,216
1889.....		161,614				161,614
1890.....		181,030				181,030
1891.....		173,887				173,887
1892.....		154,375				154,375
1893.....		508,090				508,090
1894.....		456,753			a\$41,240	497,993
1895.....		164,083		1,696,879	50,773	214,856
1896.....		164,877		b16,359,452	442,496	607,373
1897.....	{ c 150,473	d 49,816	{	b 7,725,624	223,037	433,319
		e 160,466				
1898.....	{ c 265,062	d 97,862	{	118,960	4,450	215,239
		e 112,927				
1899.....	{ c 314,348	d 115,137	{	93,115	4,286	273,919
		e 154,496				

a Not enumerated between 1868 and July 1, 1894.

b Part of this is foreign lead returned by collectors of customs by mistake as domestic lead.

c Type.

d Value of type.

e Value of all other manufactures.

According to the returns of the Treasury Department the sources of imports of lead in the calendar years 1894, 1895, 1896, 1897, 1898, and 1899 were as follows:

Sources of imports of lead.

Country.	1894.	1896.	1896.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
United Kingdom.....	6,357,937	8,161,411	1,365,132
Germany.....	1,792,305	1,113,148	.....
Other Europe.....	14,452,179	36,618,228	1,235,981
Total refined pig lead.....	22,602,421	45,892,787	2,601,113
British North America	4,969,693	15,860,906	25,672,833
Mexico.....	112,148,130	138,312,146	130,388,173
Total ore and base bullion ..	117,118,123	154,173,052	156,061,006
Other countries	241,367	931,116	1,656,398
Total imports	139,961,911	200,996,955	160,318,517

Country.	1897.	1898.	1899.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
United Kingdom.....	1,120,528	322,167	317,321
Germany.....	.....	.....	.....
Other Europe.....	1,101,151	.....	111,952
Total refined pig lead.....	2,221,679	322,167	429,273
British North America	44,171,421	36,255,163	17,871,875
Mexico.....	137,364,677	142,205,851	170,188,651
Total ore and base bullion ..	181,536,098	178,461,014	188,060,526
Other countries	1,560,635	482,800	1,142,950
Total imports	185,318,412	179,265,981	189,632,749

The subdivision by groups representing refined pig lead, and lead in ore and base bullion, is made by this office.

WAREHOUSE TRANSACTIONS.

The following table shows the warehouse transactions of lead in ore and in base bullion, monthly, during 1899, and the corresponding totals for the years 1898 and 1897:

Imports of lead in ore and base bullion during calendar year 1899, showing warehouse transactions by months.

Month.	Remaining in warehouse first day of each month.	Entered warehouse.		Addition by liquidation.
		Of direct importation.	From other districts.	
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
January, 1899.....	14,682,984	24,850,608	19,945,043	1,010,062
February, 1899.....	18,483,661	8,483,386	14,722,445	324
March, 1899.....	15,819,705	23,237,093	22,358,973	76
April, 1899.....	20,593,091	10,428,950	24,266,490	41,457
May, 1899.....	18,453,767	18,920,397	17,626,175	4,820
June, 1899.....	18,511,755	11,613,871	20,419,811	22,261
July, 1899.....	17,399,593	14,536,718	13,225,535	-----
August, 1899.....	17,530,363	17,218,122	19,022,160	12,491
September, 1899.....	20,035,710	14,500,752	12,729,296	1,461
October, 1899.....	22,345,144	10,983,796	19,063,976	-----
November, 1899.....	24,859,452	15,441,651	17,930,285	56,288
December, 1899.....	24,505,530	18,297,110	14,721,309	7,392
January, 1900.....	22,639,987	-----	-----	-----
Total, 1899.....	-----	188,512,454	216,031,498	1,156,632
Total, 1898.....	-----	170,017,006	177,837,309	1,326,934
Total, 1897.....	-----	163,365,627	167,963,673	305,862

Month.	Withdrawn from warehouse.			Deduction by liquidation.
	For exportation.	For transportation.	For consumption.	
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
January, 1899.....	12,451,962	26,732,404	428,640	2,392,030
February, 1899.....	13,379,257	9,876,324	898,649	1,715,881
March, 1899.....	15,412,919	23,479,117	574,072	1,356,648
April, 1899.....	11,916,397	19,049,910	3,695,992	2,213,922
May, 1899.....	11,968,351	20,344,636	856,915	3,323,502
June, 1899.....	15,965,882	13,256,126	704,904	3,241,193
July, 1899.....	11,348,459	13,928,177	539,194	1,815,653
August, 1899.....	13,043,875	17,485,408	370,535	2,847,608
September, 1899.....	10,554,582	11,893,556	2,067,767	406,170
October, 1899.....	10,320,493	12,846,312	1,297,174	3,069,485
November, 1899.....	12,284,414	15,668,635	1,902,944	3,926,153
December, 1899.....	12,556,171	19,985,211	1,066,241	1,283,731
January, 1900.....	-----	-----	-----	-----
Total, 1899.....	151,202,762	204,545,816	14,403,027	27,591,976
Total, 1898.....	147,978,938	163,405,296	7,844,184	28,650,385
Total, 1897.....	109,847,156	183,006,461	23,929,569	7,769,593

PRICES.

The following table gives the highest and lowest prices monthly for a series of years, compiled from market quotations:

Highest and lowest prices of lead at New York City, monthly, from 1870 to 1899, inclusive.

[Cents per pound.]

Years.	January.		February.		March.		April.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1870.....	a 6.30	6.20	6.25	6.17	6.20	6.10	6.25	6.15
1871.....	a 6.30	6.15	6.25	6.20	6.20	6.15	6.20	6.10
1872.....	a 6	5.90	6	5.87	6	5.87	6.12	5.90
1873.....	a 6.37	6.25	6.50	6.40	6.50	6.25	6.50	6.25
1874.....	a 6	5.90	6.25	6	6.25	6.12	6.25	5.90
1875.....	a 6.20	6	5.90	5.85	5.75	5.62	5.87	5.80
1876.....	a 6	5.87	6.37	6	6.50	6.40	6.40	6.12
1877.....	b 6.15	6.12	6.40	6.20	6.75	6.50	6.50	6.25
1878.....	4.35	4	3.87	3.65	3.87	3.62	3.75	3.50
1879.....	4.50	4	4.50	4.50	4.50	3.25	3.25	2.87
1880.....	6.10	5.50	6	5.87	5.95	5.30	5.75	5.40
1881.....	5	4.30	5.10	4.80	4.85	4.62	4.85	4.37
1882.....	5.15	4.95	5.20	5	5.12	4.85	5	4.90
1883.....	4.70	4.60	4.60	4.50	4.65	4.50	4.62	4.40
1884.....	4.50	3.75	4.10	3.75	4.15	4.10	4.05	3.62½
1885.....	3.70	3.55	3.70	3.60	3.70	3.62½	3.70	3.62½
1886.....	4.70	4.50	4.90	4.60	4.95	4.85	4.90	4.65
1887.....	4.45	4.15	4.50	4.25	4.45	4.25	4.32½	4.20
1888.....	4.90	4.50	5.15	4.60	5.25	5	5.05	4.55
1889.....	3.90	3.75	3.75	3.60	3.75	3.65	3.67½	3.60
1890.....	3.85	3.80	3.85	3.75	3.95	3.85	4.07½	3.85
1891.....	4.50	4.05	4.50	4.25	4.37½	4.25	4.32½	4.10
1892.....	4.30	4.10	4.25	4.05	4.22½	4.10	4.30	4.20
1893.....	3.90	3.85	3.95	3.90	4.05	3.85	4.12½	4.05
1894.....	3.25	3.15	3.35	3.20	3.45	3.25	3.45	3.37½
1895.....	3.12½	3.05	3.12½	3.07½	3.10	3.07½	3.12½	3.05
1896.....	3.15	3	3.20	3.07½	3.22½	3.07½	3.07½	3.02½
1897.....	3.12½	3.02½	3.37½	3.12½	3.40	3.35	3.40	3.25
1898.....	3.70	3.55	3.80	3.55	3.70	3.60	3.62½	3.55
1899.....	4.25	3.90	4.50	4.25	4.45	4.30	4.35	4.27½

a Gold.

b Currency.

Highest and lowest prices of lead at New York City, etc.—Continued.

[Cents per pound.]

Year.	May.		June.		July.		August.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1870.....	6.25	6.20	6.25	6.20	6.30	6.20	6.37	6.32
1871.....	6.18	6.10	6.15	6.12	6.15	6.10	6.12	6
1872.....	6.62	6.25	6.62	6.40	6.62	6.40	6.50	6.40
1873.....	6.62	6.35	6.55	6.12	6.12	6	6.25	6
1874.....	6	5.75	6	5.62	5.80	5.62	5.80	5.65
1875.....	5.95	5.90	5.90	5.75	6	5.95	5.95	5.87
1876.....	6.50	6.10	6.50	6.25	6.35	6.20	6.37	6.25
1877.....	6	5.55	5.70	5.60	5.60	5.37	5.12	4.90
1878.....	3.50	3.25	3.50	3.12	3.62	3.25	3.50	3.20
1879.....	3.12	2.87	3.80	3.12	4.10	3.90	4.05	4
1880.....	5.25	4.40	4.75	4.50	4.75	4.25	5	4.30
1881.....	4.70	4.25	4.50	4.25	4.90	4.50	4.95	4.75
1882.....	4.85	4.60	4.90	4.55	5.15	4.90	5.10	4.95
1883.....	4.55	4.40	4.45	4.40	4.40	4.30	4.30	4.20
1884.....	3.75	3.52½	3.65	3.57½	3.70	3.55	3.70	3.52½
1885.....	3.75	3.60	3.85	3.62½	4.15	3.87½	4.25	4.12
1886.....	4.75	4.65	4.90	4.65	4.90	4.75	4.80	4.75
1887.....	4.70	4.30	5.70	4.50	4.67½	4.40	4.62½	4.55
1888.....	4.62½	4	4.10	3.65	4.07½	3.85	4.97½	4.15
1889.....	3.87½	3.60	4.05	3.90	4.05	3.80	3.95	3.75
1890.....	4.35	4	4.50	4.25	4.50	4.40	4.72½	4.35
1891.....	4.37½	4.20	4.50	4.35	4.45	4.30	4.53	4.40
1892.....	4.25	4.20	4.20	4.05	4.25	4	4.15	4
1893.....	4	3.75	3.90	3.45	3.60	3.30	3.75	3.25
1894.....	3.40	3.30	3.37½	3.25	3.65	3.37½	3.70	3.30
1895.....	3.25	3.07½	3.30	3.25	3.50	3.30	3.55	3.50
1896.....	3.05	3	3.05	3	3	2.90	2.90	2.65
1897.....	3.37½	3.22½	3.60	3.25	3.90	3.65	4.10	3.70
1898.....	3.80	3.60	3.90	3.75	4	3.80	4.10	3.90
1899.....	4.50	4.37½	4.50	4.45	4.60	4.50	4.60	4.50

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Highest and lowest prices of lead at New York City, etc.—Continued.

[Cents per pound.]

Year.	September.		October.		November.		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1870.....	6.37	6.30	6.37	6.25	6.35	6.20	6.35	6.25
1871.....	6.10	6	6	5.87	6	5.90	6	5.75
1872.....	6.50	6.30	6.62	6.40	6.60	6.50	6.60	6.42
1873.....	6.62	6.37	6.75	6.25	6.50	6	6.12	6
1874.....	6.10	5.65	6.35	6.10	6.50	6.25	6.40	6.12
1875.....	5.87	5.70	5.65	5.60	5.87	5.65	5.95	5.87
1876.....	6.25	6	6	5.80	5.80	5.70	5.70	5.65
1877.....	4.85	4.75	4.85	4.25	4.75	4.50	4.60	4.50
1878.....	3.45	3.25	3.60	3.37	3.95	3.60	4	3.90
1879.....	4	3.75	5.50	4	5.62	5	5.60	5.50
1880.....	4.90	4.80	4.87	4.65	4.85	4.75	4.75	4.25
1881.....	5.37	4.95	5.25	4.87	5.25	4.90	5.25	5
1882.....	5.15	4.95	5.15	4.85	4.90	4.50	4.75	4.50
1883.....	4.32	4.30	4.32	4.12	4.05	3.65	3.75	3.60
1884.....	3.75	3.55	3.75	3.60	3.55	3.37½	3.75	3.50
1885.....	4.25	4	4.25	4	4.60	4	4.67½	4.50
1886.....	4.70	4.45	4.30	4	4.40	4.10	4.35	4.25
1887.....	4.55	4.25	4.40	4.20	4.75	4.25	5.15	4.90
1888.....	5.12½	4.90	5.12½	3.62½	3.82½	3.60	3.82½	3.60
1889.....	4	3.85	3.90	3.75	3.90	3.75	3.90	3.75
1890.....	5	4.67½	5.25	5	5.25	4.60	4.60	4.05
1891.....	4.55	4.40	4.55	4.10	4.35	4.10	4.25	4.25
1892.....	4.15	4	3.95	3.85	3.85	3.70	3.85	3.70
1893.....	3.95	3.75	3.75	3.25	3.37½	3.30	3.30	3.20
1894.....	3.30	3.10	3.15	3.05	3.12½	3.10	3.12½	3.02½
1895.....	3.45	3.32½	3.35	3.30	3.27½	3.15	3.30	3.20
1896.....	2.80	2.72½	2.92½	2.72½	3.05	2.85	3.05	2.95
1897.....	4.35	4.25	4.25	3.85	3.85	3.75	3.75	3.65
1898.....	4.05	3.90	3.90	3.60	3.70	3.65	3.80	3.60
1899.....	4.60	4.55	4.60	4.57½	4.60	4.57½	4.75	4.57½

THE LEAD MARKET.

Commercially the lead industry has during 1899 witnessed the most radical change in its history, since it has been the year of the creation of the American Smelting and Refining Company, which practically controls the market for ores, and to a very large extent that of pig lead, as the competition of the Missouri lead is confined to a comparatively narrow district. The policy has been pursued of keeping the market steady and, as one means to that end, discouraging speculation by declining to sell large blocks to dealers or to speculators. It is stated that when the consolidation was formed it was found that refiners and dealers had entered the year 1899 with a very heavy stock of pig lead, and that therefore the disturbances in the production end were not so keenly felt as they might otherwise have been. Consumption was heavy in all branches, and the average price for the year was higher than it had been since 1891. A moderate amount of foreign lead refined in bond was withdrawn for domestic consumption, the quantity being 7,200 short tons.

THE WORLD'S PRODUCTION.

An effort to state correctly the lead production of the world is beset by many difficulties. In some countries there are no reliable official statistics whatever. In others the official statistics deal only with the production of lead ores or concentrates, without any reference to their metal contents. Metallurgical statistics, which after all are the only ones of commercial value, are not touched at all. Lead ores are shipped, often in large quantities, to distant countries for smelting, and base bullion travels from the country of origin to distant refineries and desilverizing works. This renders the danger of duplication very great and makes it almost impossible to assign the lead to its actual country of origin. Thus the mineral statistics of Great Britain deal only with the production of dressed lead ore. There is no attempt to present figures relating to the production of refined lead from domestic or foreign sources. The same is true of the Australian colonies.

The only comprehensive effort to deal with these difficulties is that of the Metallgesellschaft of Frankfort on the Main. The figures for the United States are those arrived at by this office.

LEAD.

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The world's production of lead during the years 1887 to 1899.

[Metric tons.]

Country.	1887.	1888.	1889.	1890.	1891.
Germany	95,000	97,000	100,000	101,000	95,000
Spain	a 119,000	129,200	136,900	140,300	145,700
Great Britain	a 50,000	a 50,000	a 47,800	49,800	49,000
Austria	7,800	8,000	8,000	8,300	7,600
Hungary	1,800	2,000	2,300	1,200	2,100
Italy	a 19,000	17,000	18,000	17,700	18,500
Belgium	10,000	11,000	9,400	9,600	12,700
France	a 5,000	6,500	5,400	4,600	6,700
Greece	12,500	14,500	13,500	14,200	13,300
Other European countries	a 2,000	a 2,000	a 2,000	a 2,000	a 2,000
United States	132,150	137,790	141,852	130,272	161,948
Mexico	18,100	30,100	27,500	22,300	30,200
Australia b	a 10,000	a 19,000	a 35,000	40,500	56,000
Other countries	a 1,000	a 1,000	a 1,000	a 1,000	a 1,000
Total	483,350	525,090	548,652	542,772	601,748

Country.	1892.	1893.	1894.	1895.
Germany	98,000	95,000	101,000	111,058
Spain	152,300	157,100	152,620	160,786
Great Britain	44,900	38,200	42,800	55,300
Austria	7,300	7,200	7,500	8,085
Hungary	2,300	2,500	2,113	2,277
Italy	22,000	19,900	19,600	20,353
Belgium	10,100	12,000	13,500	15,573
France	8,800	8,100	8,758	7,627
Greece	14,400	12,800	14,000	19,800
Other European countries	a 2,500	a 3,000	a 4,000	a 4,000
United States	157,187	147,627	147,600	154,265
Mexico	47,500	64,000	57,000	68,000
Canada		1,000	2,586	10,467
Australia b	54,000	58,000	50,000	38,000
Other countries	a 1,000	a 1,000	a 1,000	.....
Total	622,287	627,427	624,077	675,591

a Estimated.

b Exclusive of that part of product not exported to Europe and America.

The world's production of lead during the years 1887 to 1899—Continued.

[Metric tons.]

Country.	1896.	1897.	1898.	1899.
Germany.....	113,792	118,881	132,742	129,225
Spain.....	167,017	189,000	193,000	180,000
Great Britain.....	57,200	40,300	50,000	41,500
Austria.....	10,120	9,680	10,340	<i>a</i> 10,000
Hungary.....	1,911	2,527	2,305	2,000
Italy.....	20,786	20,469	22,500	18,195
Belgium.....	17,222	17,023	19,330	<i>a</i> 16,500
France.....	8,232	9,916	10,920	<i>a</i> 11,200
Greece.....	13,200	15,600	19,200	18,400
Other European countries.....	<i>a</i> 4,000	<i>a</i> 4,500	<i>a</i> 4,500	<i>a</i> 4,500
United States.....	170,600	192,000	201,452	190,994
Mexico.....	63,000	69,800	70,600	85,000
Canada.....	10,977	17,719	14,500	10,932
Australia ^b	30,000	22,000	50,000	70,000
Other countries.....	.....	1,200	<i>a</i> 1,200	2,000
Total.....	688,057	730,615	802,589	790,446

a Estimated. *b* Exclusive of that part of product not exported to Europe and America.

In these statistics the output of Great Britain includes the lead obtained from smelting foreign ores and material.

THE WORLD'S CONSUMPTION.

The Metallgesellschaft of Frankfort on the Main figures the consumption of lead in the world as follows:

World's consumption of lead, 1890 to 1899.

[In metric tons.]

Country.	1890.	1891.	1892.	1893.	1894.
Germany	82,432	88,268	89,595	94,571	100,678
Great Britain	158,487	174,621	172,839	178,415	161,847
France	62,352	70,664	73,545	77,065	86,160
Austria-Hungary	12,785	14,011	16,600	15,604	18,442
Italy	19,733	22,552	22,787	19,985	19,942
Switzerland	2,753	1,738	1,922	1,941	1,412
Belgium	19,738	19,834	13,779	23,088	22,478
Netherlands	a 5,000	a 5,000	a 5,000	a 5,000	a 5,000
Russia	18,700	16,900	22,000	24,500	26,700
Other European countries	2,200	2,300	2,700	1,500	1,700
United States of America	154,823	181,842	191,728	179,163	173,413
All other countries	27,600	19,300	18,800	14,700	12,300
Total	566,603	617,030	631,295	635,532	630,072
Country.	1895.	1896.	1897.	1898.	1899.
Germany	111,652	121,980	129,898	155,372	160,369
Great Britain	170,130	196,200	182,334	212,163	204,944
France	64,657	77,773	86,735	82,498	77,449
Austria-Hungary	19,276	18,814	18,038	22,038	20,703
Italy	18,747	20,533	18,858	18,061	19,688
Switzerland	1,837	2,485	2,640	3,441	2,700
Belgium	17,094	20,645	23,610	23,244	22,622
Netherlands	a 5,000	a 5,000	a 5,000	a 5,000	a 5,000
Russia	21,400	20,300	24,750	22,650	23,300
Other European countries	1,600	2,100	2,300	3,800	2,400
United States of America	218,007	179,692	208,723	219,074	215,178
All other countries	10,600	12,100	9,400	8,500	8,000
Total	660,000	677,622	712,286	775,841	762,353

a Estimated.

ZINC.

By CHARLES KIRCHHOFF.

PRODUCTION.

So far as production is concerned, 1899 was the record year in the history of the zinc industry of the United States.

For a series of years the production of spelter has been as follows:

Production of speller in the United States.

Year.	Quantity.	Year.	Quantity.
	<i>Short tons.</i>		<i>Short tons.</i>
1873.....	7,343	1890.....	63,683
1875.....	15,833	1891.....	80,873
1880.....	23,239	1892.....	87,260
1882.....	33,765	1893.....	78,832
1883.....	36,872	1894.....	75,328
1884.....	38,544	1895.....	89,686
1885.....	40,688	1896.....	81,499
1886.....	42,641	1897.....	99,980
1887.....	50,340	1898.....	115,399
1888.....	55,903	1899.....	129,051
1889.....	58,860		

In the different States the production has been as follows:

Production of speller in the United States, by States.

Year.	Eastern and Southern States.	Illinois.	Kansas.	Missouri.	Total.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1882.....	5,698	18,201	7,366	2,500	33,765
1883.....	5,340	16,792	9,010	5,730	36,872
1884.....	7,861	17,594	7,859	5,230	38,544
1885.....	8,082	19,427	8,502	4,677	40,688
1886.....	6,762	21,077	8,932	5,870	42,641

MINERAL RESOURCES.

Production of spelter in the United States, by States—Continued.

Year.	Eastern and Southern States.	Illinois.	Kansas.	Missouri.	Total.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1887.....	7,446	22,279	11,955	8,660	50,340
1888.....	9,561	22,445	10,432	13,465	55,903
1889.....	10,265	23,860	13,658	11,077	58,860
1890.....	9,114	26,243	15,199	13,127	63,683
1891.....	{ a8,945 b4,217 }	{ 28,711 }	22,747	16,253	80,873
1892.....	{ a9,582 b4,913 }	{ c31,383 }	24,715	16,667	87,260
1893.....	{ a8,802 b3,882 }	{ c29,596 }	22,815	13,737	78,832
1894.....	{ a7,400 b1,376 }	{ c28,972 }	25,588	11,992	75,328
1895.....	{ a9,484 b3,697 }	{ c35,732 }	25,775	14,998	89,686
1896.....	{ a8,139 b2,427 }	{ c36,173 }	20,759	14,001	81,499
1897.....	{ a7,218 b3,365 }	{ c37,876 }	33,396	18,125	99,980
1898.....	8,631	c47,103	40,132	19,533	115,399
1899.....	8,805	c50,118	52,021	18,107	129,051

a Eastern.

b Southern.

c Including Indiana.

For semiannual periods the production of spelter has been as follows:

Production of spelter in the United States, by semiannual periods.

State.	First half 1892.	Second half 1892.	First half 1893.	Second half 1893.	First half 1894.	Second half 1894.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Eastern.....	6,901	7,594	7,380	5,304	5,064	3,712
Southern.....						
Illinois and Indiana.....	15,483	15,900	16,427	16,169	13,392	15,580
Kansas.....	14,161	10,554	13,269	9,546	11,250	14,338
Missouri.....	8,954	7,713	8,718	5,019	6,458	5,534
Total.....	45,499	41,761	45,794	36,038	36,164	39,164

Production of spelter in the United States, by semiannual periods—Continued.

State.	First half 1896.	Second half 1896.	First half 1897.	Second half 1897.	First half 1898.	Second half 1898.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Eastern.....	4,517	3,622	3,866	3,352	2,955	3,981
Southern	1,200	1,227	1,305	2,060	1,695	
Illinois and Indiana	16,305	19,868	18,054	19,822	22,129	24,974
Kansas	11,351	9,408	15,722	17,674	21,464	18,668
Missouri	5,548	8,453	7,956	10,169	10,371	9,162
Total	38,921	42,578	46,903	53,077	58,614	56,785

For 1899 and the first half of 1900 the production of spelter was as follows:

Production of spelter in the United States in 1899 and the first half of 1900.

State.	First half 1899.	Second half 1899.	First half 1900.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Illinois and Indiana	26,595	23,523	23,543
Kansas	25,972	26,049	28,283
Missouri	9,376	8,731	7,109
East and South	4,620	4,185	4,621
Total	66,563	62,488	63,556

As compared with 1899, this shows a slightly reduced rate of output. Kansas, however, has gained, while Missouri has suffered a serious decline.

During 1899 further progress has been made in the transfer of the smelting industry to the gas territory of Kansas. In 1898 the plants in the gas belt produced 19,271 tons of spelter out of the total product of 51,665 tons made in southwestern Missouri and in southeastern Kansas. In 1899 the production of this district had increased to 61,852 tons, to which the plants operated with natural gas contributed 37,632 tons, while the coal furnaces yielded only 24,220 tons, against 32,394 tons in 1898. Were it not for the constant danger of an exhaustion of the supply of natural gas, it is probable that the migration of works drawing their ores almost exclusively from the Missouri-Kansas fields, but located in the Chicago and St. Louis coal district, would be far more pronounced. During 1898 these two districts produced 54,034 short tons of spelter.

No very important changes have taken place among the smelting works except that the Edgar Zinc Company, owning the older Carondelet works near St. Louis and the new plant at Cherryvale, Kansas, is now controlled by the American Steel and Wire Company, one of the largest consumers of spelter for galvanizing purposes.

ZINC MINING IN THE GALENA-JOPLIN DISTRICT.

The output of the Galena-Joplin district of southwestern Missouri and southeastern Kansas far exceeds that of any other zinc-ore producing region. In 1898 the district increased its output enormously, and exceeded even that record in 1899, when, however, very much higher prices were realized, so that the profits in zinc mining during the year were unparalleled in its history.

The local newspapers collect weekly statistics of the production of the district, which, while they do not agree exactly, are in substantial accord. The Joplin Herald prints figures for the year 1899, from which the following statistics for the various camps are copied:

Production of zinc and lead ore in the Galena-Joplin district in 1899.

Camp.	Zinc ore.		Lead ore.		Total value.
	Quantity.	Value.	Quantity.	Value.	
	<i>Short tons.</i>		<i>Short tons.</i>		
Galena	64,053	\$2,327,615	7,083	\$345,889	\$2,673,504
Joplin	43,598	1,744,045	6,513	362,278	2,106,323
Cartersville	28,645	1,141,501	5,193	272,664	1,414,165
Aurora	27,331	922,934	491	31,244	954,178
Oronogo	21,886	887,265	206	10,686	897,951
Webb City	13,626	517,212	505	54,365	571,577
Duenweg	8,969	347,497	1,272	70,534	418,031
Granby	6,691	235,691	414	34,473	270,164
Stotts City	6,420	271,738	197	10,322	282,060
Belville	6,604	260,930	73	5,861	266,791
Central City	9,172	355,185	386	20,504	375,689
Cave Springs	1,163	40,576	54	3,120	43,696
Gregg	1,769	120,306	199	10,669	130,975
Neck	2,600	105,343	439	22,911	128,254
Alba	1,088	47,778	-----	-----	47,778
Carthage	1,725	69,648	3	166	69,814
Sundries	5,032	181,814	925	48,700	230,514
Total	250,372	9,577,078	23,953	1,304,386	10,881,464

The figures collected by the Joplin Mining News for 1899 and for previous years are as follows:

Production of zinc and lead ore in the Galena-Joplin district.

Year.	Zinc.	Lead.	Total value, both ores.
	<i>Short tons.</i>	<i>Short tons.</i>	
1894.....	147,310	32,199	\$3,535,736
1895.....	144,487	31,294	3,775,929
1896.....	155,333	27,721	3,857,355
1897.....	177,976	30,105	4,726,302
1898.....	234,455	26,687	7,119,867
1899.....	255,088	23,888	10,715,307

These figures show how large the production of zinc ore has grown in recent years, while the values indicate what an effect the high prices for ore have had. The nominal prices in each month are shown in the following table:

Average base prices of zinc and lead ores in 1899.

Month.	Zinc, per ton.	Lead, per 1,000 pounds.
January.....	\$32.25	\$23.94
February.....	43.38	26.50
March.....	43.40	25.80
April.....	51.50	25.25
May.....	50.50	26.00
June.....	45.50	26.00
July.....	44.25	27.13
August.....	45.00	27.25
September.....	43.70	27.00
October.....	43.38	25.88
November.....	35.00	26.88
December.....	35.00	27.30
Average, 1899.....	38.50	27.23
1898.....	28.44	.....
1897.....	22.28	.....
1896.....	22.33	.....

Prices realized vary according to the zinc contents of the ore, deduction being made for iron contents. The following ore schedule, adopted January 22, 1900, by the Missouri and Kansas Zinc Miners' Association, may serve to illustrate this:

Schedule of prices of ore per ton in the Galena-Joplin district.

Per cent of zinc.	Price of ore free from iron.	Price of ore containing iron.			
		1 per cent.	2 per cent.	3 per cent.	4 per cent.
63.....	\$36.00	\$35.00	\$34.00	\$33.00	\$32.00
62.....	35.00	34.00	33.00	32.00	31.00
61.....	34.00	33.00	32.00	31.00	30.00
60.....	33.00	32.00	31.00	30.00	29.00
59.....	32.00	31.00	30.00	29.00	27.50
58.....	31.00	30.00	29.00	27.50	26.00
57.....	30.00	29.00	27.50	26.00	24.50
56.....	29.00	27.50	26.00	24.50	23.00
55.....	27.50	26.00	24.50	23.00	21.50
54.....	26.00	24.50	23.00	21.50	20.00
53.....	24.50	23.00	21.50	20.00	18.50
52.....	23.00	21.50	20.00	18.50	17.00
51.....	21.50	20.00	18.50	17.00	15.50
50.....	20.00	18.50	17.00	15.50	14.00

The year was one of extraordinary prices for ore in the district. The year opened with \$29.50 for top grades and before the middle of February the price had reached \$45. The maximum price of \$55 was reached in May. By the end of June, however, the price was down to \$44 for top grades. In July a two-weeks shut down was ordered by the miners' association to check the declining tendency. In August the association fixed a schedule, based on \$43 for 60 per cent ore, but even a fairly observed order to shut down during the whole of October did not prove sufficiently effective, in view of the adverse situation in the metal trade. Efforts to arrange for the export of a surplus of spelter were unsuccessful, and the ore market receded toward the end of the year to \$31 base.

The year was one of extraordinary development in prospecting, in mining, and in the construction of concentrating plants, and the unparalleled flow of outside capital into the district, which was begun in 1898, continued in 1899.

A good deal of work has been done in the Arkansas fields, and it is probable that extensive developments will soon follow.

The high prices of zinc ore attracted attention to the mineral in Colorado and considerable quantities were shipped during 1899 from Leadville, Creede, and Montezuma, a part going abroad via Galveston.

In the East the output of the famous Franklin mines in New Jersey is being increased, and a large new concentrating mill has been begun. The New Jersey Zinc Company is also building at Palmerton, near Mauch Chunk, Pennsylvania, large works for the production of spelter, oxide, and spiegeleisen.

In Virginia and Tennessee there was considerable resumption of activity in zinc mining in 1899.

CONSUMPTION.

During 1899 the consumption of spelter reached its highest point. The following estimate may be presented, coupled with the statement, however, that the reports of stocks from the producers are only partial and are therefore in reality considerably larger. In a degree, however, the figures reflect the fluctuations in the stocks and thus possess some value as indicating the relative position from year to year:

Estimated consumption of spelter, 1895, 1896, 1897, 1898, and 1899.

Source, etc.	1895.	1896.	1897.	1898.	1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Production	89,686	81,499	99,980	115,399	129,051
Imports	432	428	1,279	1,303	1,392
Stocks at beginning of year	4,911	5,802	7,477	5,709	3,695
Total supply.....	95,029	87,729	108,736	122,411	134,138
Deduct—					
Exports of foreign....		4		18	
Exports of domestic..	1,530	10,130	14,245	10,499	6,755
Stock at end of year.	5,802	7,477	5,709	3,695	2,798
Total.....	7,332	17,611	19,954	14,212	9,553
Apparent home consumption.....	87,697	70,118	88,782	108,199	124,585

During the first half of 1900 the consumption is estimated as follows:

Consumption of spelter, first half of 1900.

Source, etc.	Quantity.
	<i>Short tons.</i>
Production	63, 556
Imports	616
Stock, January 1, 1900	2, 798
Total	66, 970
Deduct—	
Exports of domestic	15, 534
Stock, July 1, 1900	4, 438
Total	19, 972
Apparent home consumption	46, 998

There has therefore been a very marked decline in the consumption during the first half of 1900.

IMPORTS AND EXPORTS.

Zinc imported and entered for consumption in the United States, 1867 to 1899.

Year ending—	Blocks or pigs.		Sheets.	
	Quantity.	Value.	Quantity.	Value.
June 30—	<i>Pounds.</i>		<i>Pounds.</i>	
1867.....	5, 752, 611	\$256, 366	5, 142, 417	\$311, 767
1868.....	9, 327, 968	417, 273	3, 557, 448	203, 883
1869.....	13, 211, 575	590, 332	8, 306, 723	478, 646
1870.....	9, 221, 121	415, 497	9, 542, 687	509, 860
1871.....	11, 159, 040	508, 355	7, 646, 821	409, 243
1872.....	11, 802, 247	522, 524	10, 704, 944	593, 885
1873.....	6, 839, 897	331, 399	11, 122, 143	715, 706
1874.....	3, 593, 570	203, 479	6, 016, 835	424, 504
1875.....	2, 034, 252	101, 766	7, 320, 713	444, 539
1876.....	947, 322	56, 082	4, 611, 360	298, 308
1877.....	1, 266, 894	63, 250	1, 341, 333	81, 815
1878.....	1, 270, 184	57, 753	1, 255, 620	69, 381
1879.....	1, 419, 791	53, 294	1, 111, 225	53, 050
1880.....	8, 092, 620	371, 920	4, 069, 310	210, 230
1881.....	2, 859, 216	125, 457	2, 727, 324	129, 158
1882.....	18, 408, 391	736, 964	4, 413, 042	207, 032
1883.....	17, 067, 211	655, 503	3, 309, 239	141, 823
1884.....	5, 869, 738	298, 852	952, 253	36, 120
1885.....	3, 515, 840	113, 268	1, 839, 860	64, 781

Zinc imported and entered for consumption in the United States, 1867 to 1899—Cont'd.

Year ending—	Blocks or pigs.		Sheets.	
	Quantity.	Value.	Quantity.	Value.
December 31—	<i>Pounds.</i>		<i>Pounds.</i>	
1886.....	4,300,830	\$136,138	1,092,400	\$40,320
1887.....	8,387,647	276,122	926,150	32,526
1888.....	3,825,947	146,156	295,287	12,558
1889.....	2,052,559	77,845	1,014,873	43,356
1890.....	1,997,524	101,335	781,366	43,495
1891.....	808,094	41,199	21,948	1,460
1892.....	297,969	16,520	27,272	2,216
1893.....	425,183	22,790	28,913	1,985
1894.....	387,788	13,788	39,947	2,061
1895.....	744,301	26,782	42,513	2,773
1896.....	1,040,719	32,096	27,321	1,358
1897.....	2,905,451	109,520	15,971	786
1898.....	2,605,028	104,669	39,712	2,724
1899.....	2,783,329	143,557	86,878	6,354

Year ending—	Old.		Value of man- ufactures.	Total value.
	Quantity.	Value.		
June 30—	<i>Pounds.</i>			
1867.....			\$1,835	\$569,968
1868.....			1,623	622,779
1869.....			2,083	1,071,061
1870.....			21,696	947,053
1871.....			26,366	943,964
1872.....			58,668	1,175,077
1873.....			56,813	1,103,918
1874.....			48,304	676,287
1875.....			26,330	572,635
1876.....			18,427	372,817
1877.....			2,496	147,561
1878.....			4,892	132,026
1879.....			3,374	109,718
1880.....			3,571	585,721
1881.....			7,603	262,218
1882.....			4,940	948,936
1883.....			5,606	802,932
1884.....			4,795	249,767
1885.....			2,054	180,103

Zinc imported and entered for consumption in the United States, 1867 to 1899—Cont'd.

Year ending—	Old.		Value of man- ufactures.	Total value.
	Quantity.	Value.		
December 31—	<i>Pounds.</i>			
1886.....			\$9, 162	\$185, 620
1887.....			11, 329	319, 977
1888.....			12, 080	170, 794
1889.....			19, 580	140, 781
1890.....			9, 740	154, 570
1891.....				42, 659
1892.....	115, 203	\$6, 556	20, 677	45, 969
1893.....	265	21	16, 479	41, 275
1894.....	27, 754	530	11, 816	28, 195
1895.....	64, 398	899	9, 953	40, 407
1896.....	14, 855	267	9, 800	43, 521
1897.....	41, 643	886	11, 459	122, 651
1898.....	96, 899	3, 417	11, 211	122, 021
1899.....	167, 954	6, 932	8, 824	165, 667

Imports of zinc oxide from 1885 to 1899.

Year ending—	Dry.	In oil.	Year ending—	Dry.	In oil.
	<i>Pounds.</i>	<i>Pounds.</i>	December 31—	<i>Pounds.</i>	<i>Pounds.</i>
June 30, 1885 .	2, 233, 128	98, 566	1892.....	2, 442, 014	111, 190
December 31—			1893.....	3, 900, 749	254, 807
1886.....	3, 526, 289	79, 788	1894.....	3, 371, 292	59, 291
1887.....	4, 961, 080	123, 216	1895.....	4, 546, 049	129, 343
1888.....	1, 401, 342	51, 985	1896.....	4, 572, 781	311, 023
1889.....	2, 686, 861	66, 240	1897.....	5, 564, 763	502, 357
1890.....	2, 631, 458	102, 298	1898.....	3, 342, 235	27, 050
1891.....	2, 839, 351	128, 140	1899.....	3, 012, 709	41, 699

Exports of zinc and zinc ore of domestic production from 1864 to 1899.

Year ending—	Ore or oxide.		Plates, sheets, pigs, or bars.		Value of manufactures.	Total value.
	Quantity.	Value.	Quantity.	Value.		
June 30—	Cwt.		Pounds.			
1864.....	14,810	\$116,431	95,738	\$12,269		\$128,700
1865.....	99,371	114,149	184,183	22,740		136,889
1866.....	4,485	25,091	140,798	13,290		38,381
1867.....	3,676	32,041	312,227	30,587		62,628
1868.....	8,344	74,706	1,022,699	68,214		142,920
1869.....		65,411				65,411
1870.....	15,286	81,487	110,157	10,672		92,159
1871.....	9,621	48,292	76,380	7,823		56,115
1872.....	3,686	20,880	62,919	5,726		26,606
1873.....	234	2,304	73,953	4,656		6,960
1874.....	2,550	20,037	43,566	3,612		23,649
1875.....	3,083	20,659	38,090	4,245	\$1,000	25,904
1876.....	10,178	66,259	134,542	11,651	4,333	82,243
1877.....	6,428	34,468	1,419,922	115,122	1,118	150,708
1878.....	16,050	83,831	2,545,320	216,580	567	300,978
1879.....	10,660	40,399	2,132,949	170,654		211,053
1880.....	13,024	42,036	1,368,302	119,264		161,300
1881.....	11,390	16,405	1,491,786	132,805	168	149,378
1882.....	10,904	13,736	1,489,552	124,638		138,374
1883.....	3,045	11,509	852,333	70,981	734	83,224
1884.....	4,780	16,685	126,043	9,576	4,666	30,927
1885.....	6,840	22,824	101,685	7,270	4,991	35,085
December 31—						
1886.....	26,620	49,455	917,229	75,192	13,526	138,173
1887.....	4,700	17,286	136,670	9,017	16,789	43,092
1888.....	4,560	18,034	62,234	4,270	19,098	41,402
1889.....	26,760	73,802	879,785	44,049	35,732	153,583
1890.....	77,360	195,113	3,295,584	126,291	23,587	344,991
1891.....	115,820	149,435	4,294,656	278,182	38,921	466,538
1892.....	18,380	41,186	12,494,335	669,549	166,794	877,529
1893.....	980	1,271	7,446,934	413,673	224,787	639,731
1894.....		5	3,607,050	144,074	99,406	243,485
1895.....	480	1,008	3,060,805	153,175	50,051	204,234
1896.....	41,500	47,408	20,260,169	1,013,620	51,001	1,112,029
1897.....	165,200	211,350	28,490,662	1,356,538	71,021	1,638,909
1898.....	210,400	299,870	20,998,413	1,033,959	138,165	1,471,994
1899.....	503,940	725,944	13,509,316	742,521	143,232	1,611,697

The following table shows the exports of ore and of spelter by customs districts during the calendar year 1899:

Domestic exports of zinc, by customs districts, during the calendar year 1899.

Customs district.	Ore.		Pigs, bars, plates, etc.	
	Quantity.	Value.	Quantity.	Value.
	<i>Tons.</i>		<i>Pounds.</i>	
New York, N. Y.	14, 075	\$400, 159	939, 462	\$61, 438
Philadelphia, Pa.	3, 760	109, 750		
Galveston, Tex.	5, 847	197, 840	5, 466, 725	318, 192
Mobile, Ala.			463	67
New Orleans, La.	439	15, 365	6, 624, 532	336, 591
Detroit, Mich.			302, 390	16, 176
Huron, Mich.			148, 375	8, 280
North and South Dakota.			2, 000	160
Vermont.			4, 130	264
Boston and Charlestown, Mass.			13, 356	580
Newport News, Va.	22	550		
Saluria, Tex.			408	38
Puget Sound, Wash.	54	2, 280		
All other districts.			7, 475	735
Total.	24, 197	725, 944	13, 509, 316	742, 521

These figures are interesting, since they show that, with the exception of the high-grade spelter shipped from New York, the bulk of the exports is of western common spelter via Galveston and New Orleans.

The ore exports from New York and Philadelphia are from the New Jersey mines, while the bulk of the ore exported from Galveston is Colorado product.

The destination of the ore and spelter exports during 1899 is exhibited in the following table:

Domestic exports of zinc, by countries, during the calendar year 1899.

Country.	Ore.		Pigs, bars, plates, etc.	
	Quantity.	Value.	Quantity.	Value.
	<i>Tons.</i>		<i>Pounds.</i>	
Belgium	5,636	\$189,672	226,500	\$11,325
France			932,166	46,858
Germany	10	339	12,249	702
Netherlands	18,047	516,724	12,560	806
Russia, Baltic and White seas			224,000	13,440
United Kingdom	450	16,929	11,541,072	636,636
Dominion of Canada:				
Nova Scotia, New Brunswick			1,245	98
Quebec, Ontario, etc			456,895	24,880
British Columbia	54	2,280		
Central American States:				
Honduras			98	10
Nicaragua			1,902	157
Mexico			46,504	3,562
West Indies:				
British			875	45
Haiti			3,289	289
Colombia			11,575	1,064
Ecuador			7,051	568
British Africa			660	33
All other countries			30,675	2,048
Total	24,197	725,944	13,509,316	742,521

The ore forwarded to the Netherlands is, of course, in transit to smelters in Belgium and in western Germany.

Great Britain, it will be observed, takes by far the greater part of the spelter shipped from this country.

PRICES.

During 1899 the spelter market was affected by a variety of causes, which led to somewhat violent fluctuations. In the earlier part of the year the extraordinary demand created higher prices for the metal, which in turn acted upon the prices for ore, which again reacted upon the cost of the metal. Simultaneously there had been a very marked advance in iron and steel, which culminated in prices checking consumption of galvanized sheets and wire. With the exception of a temporary reaction in March, the market advanced from the beginning of the year to the end of May. Then buying fell off until, in September, the inducement of low prices led consumers to come into the market again. It was then that the Missouri and Kansas Miners' Association made an effort to regulate the market by ordering a restriction, but prices continued to decline to the end of the year.

The fluctuations in prices during the year in St. Louis (the primary market), in New York, and in London are given in the following table:

Fluctuations in prices of spelter in 1899.

Month.	St. Louis (per pound).	New York (per pound).	London (per long ton).					
	<i>Cents.</i>	<i>Cents.</i>	£	s.	d.	£	s.	d.
January	4.80 to 5.45	5.15 to 5.70	25	15	0	to 26	5	0
February	5.60 to 6	5.70 to 6.50	26	5	0	to 28	0	0
March	5.80 to 6.10	6.25 to 6.50	26	15	0	to 27	17	6
April	6.15 to 6.60	6.20 to 6.80	27	12	6	to 28	15	0
May	6.45 to 7	6.75 to 7	28	10	0	to 28	15	0
June	5.27½ to 6.50	6.15 to 6.75	25	0	0	to 28	2	6
July	5.50 to 5.92½	6 to 6.25	25	0	6	to 26	2	6
August	5.40 to 5.75	5.30 to 6	22	5	0	to 25	15	0
September	5.25 to 5.50	5.20 to 5.75	21	15	0	to 24	0	0
October	4.85 to 5.35	5.15 to 5.50	21	7	6	to 22	12	6
November	4.20 to 4.80	4.50 to 5	19	15	0	to 21	15	0
December	4.20 to 4.65	4.55 to 4.70	19	15	0	to 20	10	0

The following table summarizes the prices of spelter since 1875:

Price of common Western spelter in New York City, 1875 to 1899.

[Cents per pound; figures in parentheses are combination prices.]

Year.	January.		February.		March.		April.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1875.....	6.75	6.37	6.67	6.25	6.50	6.20	(7)	6.50
1876.....	(7.60)	7.40	(7.75)	7.50	(7.75)	7.62	(8)	7.60
1877.....	6.50	6.25	6.62	6.50	6.50	6.37	6.37	6.25
1878.....	5.75	5.50	5.62	5.25	5.62	5.25	5.25	5
1879.....	4.50	4.25	4.62	4.40	4.62	4.37	4.75	4.25
1880.....	6.50	5.87	6.75	6.37	6.75	6.50	6.50	6.12
1881.....	5.25	4.87	5.25	5.12	5	4.87	5.12	4.75
1882.....	6	5.75	5.75	5.62	5.62	5.37	5.50	5.25
1883.....	4.62	4.50	4.62	4.50	4.75	4.62	4.75	4.60
1884.....	4.37	4.20	4.40	4.25	4.60	4.40	4.65	4.50
1885.....	4.50	4.12	4.30	4.25	4.30	4.12	4.30	4.12
1886.....	4.50	4.30	4.55	4.30	4.60	4.50	4.60	4.50
1887.....	4.60	4.50	4.60	4.40	4.60	4.40	4.65	4.45
1888.....	5.37	5.20	5.35	5.25	5.25	4.87	4.87	4.60
1889.....	5	5	5	4.90	4.87	4.70	4.65	4.65
1890.....	5.45	5.35	5.35	4.20	5.20	5	5	4.90
1891.....	6	5.25	5.25	5	5.10	5	5.10	4.90
1892.....	4.70	4.60	4.60	4.55	4.60	4.50	4.80	4.60
1893.....	4.35	4.30	4.30	4.25	4.25	4.20	4.50	4.30
1894.....	3.60	3.50	4	3.60	3.85	3.80	3.75	3.50
1895.....	3.35	3.20	3.20	3.10	3.20	3.15	3.30	3.25
1896.....	4.05	4	4.15	4	4.15	4.10	4.20	4.05
1897.....	4.10	3.90	4.10	4	4.15	4.10	4.15	4.10
1898.....	4	3.90	4.10	3.90	4.25	4.15	4.30	4.15
1899.....	5.70	5.15	6.50	5.70	6.50	6.25	6.80	6.20

Price of common Western spelter in New York City, 1875 to 1899—Continued.

Year.	May.		June.		July.		August.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1875.....	(7.25)	7.15	(7.25)	7.15	(7.35)	7.25	(7.25)	7.10
1876.....	(8)	7.75	(8)	7.25	7.25	7.12	7.25	7
1877.....	6.25	6	6.12	5.87	5.87	5.62	5.90	5.80
1878.....	5	4.62	4.62	4.25	4.75	4.50	4.87	4.50
1879.....	4.50	4.25	4.37	4.12	4.75	4.37	5.62	4.80
1880.....	6	4.62	5.50	5.12	5	4.87	5.25	4.87
1881.....	5	4.87	5	4.75	5	4.75	5.12	5
1882.....	5.62	5.25	5.37	5.25	5.37	5.12	5.50	5.12
1883.....	4.75	4.50	4.62	4.37	4.50	4.30	4.40	4.30
1884.....	4.60	4.45	4.60	4.45	4.55	4.45	4.62	4.52
1885.....	4.25	4.10	4.10	4	4.40	4.10	4.60	4.40
1886.....	4.60	4.40	4.40	4.35	4.40	4.30	4.40	4.30
1887.....	4.65	4.45	4.65	4.50	4.50	4.50	4.60	4.55
1888.....	4.65	4.60	4.60	4.50	4.55	4.50	4.87	4.50
1889.....	4.85	4.62	5	5	5.10	5	5.20	5.15
1890.....	5.45	5	5.60	5.35	5.60	5.40	5.55	5.40
1891.....	4.90	4.85	5.10	4.90	5.10	5.05	5.10	5
1892.....	4.90	4.80	4.90	4.80	4.85	4.70	4.70	4.65
1893.....	4.40	4.20	4.25	4.15	4.15	3.90	3.90	3.55
1894.....	3.55	3.45	3.50	3.40	3.50	3.45	3.45	3.40
1895.....	3.65	3.30	3.75	3.30	3.85	3.70	4.20	4
1896.....	4.15	4	4.15	4	4.10	3.90	3.90	3.65
1897.....	4.20	4.10	4.25	4.15	4.30	4.20	4.35	4.25
1898.....	4.30	4.10	5.15	4.30	4.80	4.45	4.75	4.45
1899.....	7.00	6.75	6.75	6.15	6.25	6.00	6.00	5.30

Price of common Western spelter in New York City, 1875 to 1899—Continued.

Year.	September.		October.		November.		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1875.....	(7.25)	7.10	(7.40)	7.15	(7.40)	7.15	(7.40)	7.15
1876.....	7.12	6.80	6.75	6.62	6.62	6.37	6.50	6.37
1877.....	5.87	5.75	5.90	5.70	5.87	5.62	5.75	5.50
1878.....	4.87	4.75	4.82	4.50	4.75	4.50	4.37	4.25
1879.....	6	5.62	6.37	6	6.25	5.87	6.25	6
1880.....	5.12	4.75	5	4.87	4.90	4.65	4.75	4.65
1881.....	5.25	5	5.37	5.25	5.87	5.50	6	5.87
1882.....	5.37	5.12	5.37	5.12	5.12	4.87	4.87	4.50
1883.....	4.50	4.40	4.45	4.35	4.40	4.37	4.37	4.35
1884.....	4.62	4.50	4.55	4.40	4.40	4.30	4.25	4
1885.....	4.62	4.50	4.62	4.50	4.60	4.45	4.60	4.45
1886.....	4.40	4.25	4.30	4.25	4.30	4.25	4.50	4.35
1887.....	4.65	4.60	4.65	4.50	4.80	4.52	5.87	5
1888.....	5.12	4.75	5.12	4.87	5.12	4.87	5.12	4.87
1889.....	5.15	5.10	5.15	5.10	5.25	5.05	5.35	5.30
1890.....	5.65	5.50	6	5.65	6.10	5.90	6	5.90
1891.....	5	4.85	5.15	4.95	4.90	4.75	4.75	4.65
1892.....	4.65	4.50	4.50	4.35	4.40	4.35	4.40	4.35
1893.....	3.75	3.65	3.70	3.55	3.85	3.60	3.80	3.70
1894.....	3.50	3.40	3.50	3.37	3.40	3.35	3.35	3.25
1895.....	4.35	4.15	4.20	3.90	3.80	3.45	3.50	3.40
1896.....	3.70	3.60	3.75	3.65	4.25	3.75	4.25	4.15
1897.....	4.35	4.25	4.30	4.15	4.25	3.90	3.90	3.75
1898.....	4.82½	4.70	5.15	4.82½	5.25	5.15	5.30	4.90
1899.....	5.75	5.20	5.50	5.15	5	4.50	4.70	4.55

THE WORLD'S PRODUCTION.

Messrs. Henry R. Merton & Co., Limited, of London, on the basis of detailed reports make the production of spelter in Europe as follows:

Production of zinc in Europe from 1894 to 1899.

[Long tons.]

	1894.	1895.	1896.	1897.	1898.	1899.
Rhine, Belgium, and Holland....	152,420	172,135	179,730	184,455	188,815	189,955
Silesia	91,145	94,015	95,875	94,045	97,670	98,590
Great Britain	32,065	29,495	24,880	23,550	27,940	31,715
Austria	8,580	8,355	9,255	8,185	7,115	7,190
France and Spain ..	21,245	22,895	28,450	32,120	32,135	32,955
Poland	5,015	4,960	6,165	5,760	5,575	6,225
Total	310,470	331,855	344,355	348,115	359,250	366,630
United States	67,257	80,076	72,767	89,268	103,061	115,224
Total world's production.	377,727	411,931	417,122	437,383	462,311	481,854
United States per- centage of world's produc- tion	17.8	19.4	17.4	20.4	22.3	23.9

It will be observed that the United States in 1899 produced nearly one-quarter of the world's output.

ALUMINUM AND BAUXITE.

ALUMINUM.

PRODUCTION.

The production of aluminum in 1899 continued practically the same as in the previous year, amounting to 5,200,000 pounds. The entire production is in the hands of a single company, the Pittsburg Reduction Company, which controls the Hall patents in the United States. The demand for the metal has been considerably in excess of the supply, although, owing to the policy of the producers, there has been no consequent increase in price; rather, a slight reduction was noticed toward the end of the year. The selling price in the United States for No. 1 ingots (99 per cent pure) ranged from 33 to 37 cents per pound, and for No. 2 (90 per cent pure) from 31 to 34 cents per pound, according to quantity purchased. Arrangements are being made by the Pittsburg Reduction Company for a considerable extension of their works, and an enlarged production may be looked for in 1900. The following table shows the production for each year since the beginning of the industry in 1883:

Production of aluminum in the United States from 1883 to 1899.

Year.	Quantity.	Year.	Quantity.
	<i>Pounds.</i>		<i>Pounds.</i>
1883.....	83	1893.....	333,629
1884.....	150	1894.....	550,000
1885.....	283	1895.....	920,000
1886.....	3,000	1896.....	1,300,000
1887.....	18,000	1897.....	4,000,000
1888.....	19,000	1898.....	5,200,000
1889.....	47,468	1899.....	5,200,000
1890.....	61,281	Total.....	18,062,779
1891.....	150,000		
1892.....	259,885		

NEW USES FOR ALUMINUM.

Owing to the marked increase in the price of copper during the year the field for the utilization of aluminum has been greatly expanded. Successful experiments have been made during the year in the use of aluminum, both pure and alloyed with copper, for electrical conductors. The weight of a wire of pure aluminum is 48 per cent of the weight of a copper wire of equal conductivity. Hence the price of aluminum per pound might be a little more than twice that of copper and still the cost of the conductors for a given amount of electrical power would be the same if constructed of either metal. The price of aluminum, however, is only a little over 50 per cent greater per pound than that of copper. Aluminum, therefore, is considerably less expensive than copper for this purpose. The first actual application of the metal on a large scale for this purpose has been made during the year by the Chicago and Northwestern Elevated Road. Twenty miles of 1½-inch cables, weighing 150,000 pounds, have been put in place to distribute the motive power to the trolley cars of the new road.

Another important use for the metal is as a reducing agent in the preparation of the metals from such refractory materials as the oxides of chromium, titanium, tungsten, vanadium, molybdenum, etc. The finely powdered aluminum is intimately mixed with these metallic oxides in a refractory crucible and enough barium peroxide is added to start the reaction. The mixture is readily ignited, and the extremely active oxidation of the powdered aluminum reduces the oxides of the other metals present. The use of metals prepared in this way for combination with steel has been found very much more satisfactory than when the various alloys with iron are employed. The powdered metal is also coming into use for the production of flash lights for photography, replacing magnesium for this purpose. It is also extensively used as a paint, being simply mixed with a varnish like ordinary bronzing powders.

The field of investigation of the various alloys of aluminum is a wide one, and considerable attention has been given to it in the past year. A new alloy of aluminum and magnesium, called magnalium, has been prepared, containing from 75 to 90 per cent of the former metal with 10 to 25 per cent of the latter. The color of the resulting metal ranges from tin-white through blue-white to brass-yellow, as the proportion of magnesium increases. Since the latter metal is 40 per cent lighter in weight than aluminum, the alloy is also of less specific gravity. It is harder than aluminum, will take a fine polish, is unalterable in the air, and can be worked as readily as brass. Its principal application in the arts will probably be in the manufacture of scientific instruments where lightness is desirable and it is necessary at the same time to have sufficient hardness to hold fine graduations.

These are merely a few of the more important recent additions to the use of the metal in the arts. A complete list of the uses to which it has been successfully applied would be a very long one. The price of the metal will doubtless continue to decrease as the various processes in its preparation are improved, and particularly when the expiration of the present patent permits free competition in its production. Even at the present price it is considerably cheaper, bulk for bulk, than copper or brass, and if the supply were sufficient to meet the growing demand, its uses would increase even more rapidly than they have done.

IMPORTS.

Aluminum imported and entered for consumption in the United States from 1870 to 1890.

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
June 30—	Pounds.		June 30—	Pounds.	
1870.....		\$98	1881.....	517. 10	\$6,071
1871.....		341	1882.....	556. 50	6,450
1872.....			1883.....	426. 25	5,070
1873.....	2	2	1884.....	595	8,416
1874.....	683	2,125	1885.....	439	4,736
1875.....	434	1,355	Dec. 31—		
1876.....	139	1,412	1886.....	452. 10	5,369
1877.....	131	1,551	1887.....	1,260	12,119
1878.....	251	2,978	1888.....	1,348. 53	14,086
1879.....	284. 44	3,423	1889.....	998	4,840
1880.....	340. 75	4,042	1890.....	2,051	7,062

Imports of crude and manufactured aluminum from 1891 to 1899.

Calendar year.	Crude.		Leaf.		Plates, sheets, bars, and rods.		Manufactures.	Total value.
	Quantity.	Value.	Packs of 100.	Value.	Quantity.	Value.		
	Pounds.				Pounds.			
1891...	3,922	\$6,266	10,033	\$1,135			\$1,161	\$8,562.
1892...	43	51	11,540	1,202			1,036	2,289
1893...	7,816	4,683	18,700	1,903			1,679	8,265
1894...	5,306	2,514	10,780	1,210			386	4,110
1895...	25,294	7,814	6,610	646			1,841	10,301
1896...	698	591	4,657	523			2,365	3,479
1897...	1,822	1,082	4,260	368	4,424	\$3,058	221	4,729
1898...	60	30	2,000	174	18,442	8,991	4,675	13,870
1899...	53,622	9,425	693	112	4,254	2,413	5,303	17,253

BAUXITE.

PRODUCTION.

The production in 1899 amounted to 35,280 long tons, valued at \$125,598. This shows an increase over the production in 1898 of 10,131 long tons, or 40 per cent, in quantity, and of \$50,161, or 66 per cent, in value.

Until the present year Georgia and Alabama have been the only States producing bauxite on a commercial scale. This year, however, Arkansas entered the field with a production of 5,045 long tons. The following table gives the output and value each year since the beginning of production in 1889:

Production of bauxite in the United States from 1889 to 1899, by States.

Calendar year.	Georgia.	Alabama.	Arkansas.	Total.	Value.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	
1889.....	728			728	\$2,366
1890.....	1,844			1,844	6,012
1891.....	3,301	292		3,593	11,675
1892.....	5,110	5,408		10,518	34,183
1893.....	2,415	6,764		9,179	29,507
1894.....	2,050	9,016		11,066	35,818
1895.....	3,756	13,313		17,069	44,000
1896.....	7,313	11,051		18,364	47,338
1897.....	7,507	13,083		20,590	57,652
1898.....				25,149	75,437
1899.....	15,736	14,499	5,045	35,280	125,598

Of the 10,131 tons of increased production in 1899 over 1898, about half is to be credited to the new field in Arkansas. The most important feature in the development of the industry during 1899 has been the entry of this new field as a producer.

Georgia-Alabama field.—Many of the most important deposits in the Georgia-Alabama field are either entirely exhausted or are rapidly approaching that condition. Thus the Dykes, Warwhoop, Gaines Hill, and Washer banks in Alabama are entirely exhausted or have been worked to such a depth that the remaining ore can not be economically extracted by reason of the caving in of the surrounding clay. A few of the smaller deposits in the vicinity of the Dykes bank are still producing, but the amount of ore in sight is small compared with that which has already been mined in this district. In Georgia the deposits of the Hermitage district are mostly exhausted. The Church bank is still being worked, although at a depth which indicates its early

exhaustion. The largest body of ore remaining in this district is probably at the Waters bank, which, at the present rate of mining, will undoubtedly continue to be productive for a number of years. Several deposits of the Bobo district have recently become important producers, and, together with the Waters bank, will be the chief reliance of the Georgia-Alabama field in the future.

Arkansas.—Four companies have made more or less extensive investments in the Arkansas district, and are preparing for a large output in the near future. Considerable shipments have been made by Mr. E. E. Metzner, partly to a plant established at Mabelvale, Arkansas, for the production of alumina and aluminum salts. This enterprise is as yet in the experimental stage. Mr. Metzner has also made some shipments to Eastern consumers. Regular shipments were made for several months in the latter part of the year by the Illinois Chemical Company, chiefly to their own factory at Chicago Heights, Illinois. This ore was used entirely for the manufacture of alum. Some shipments were also made by the Pittsburg Reduction Company to eastern consumers at Pittsburg and elsewhere. The Southern Bauxite Mining and Manufacturing Company, which has acquired a large proportion of the bauxite deposits in this district, has as yet made only experimental shipments, but is doing extensive development work with a view to a large output in the near future.

The geologic conditions under which the bauxite occurs in Arkansas are entirely different from those in the Georgia-Alabama field. The ore in the Arkansas district forms a bed having great lateral extent as compared with its thickness. Mining will, therefore, be attended by much less uncertainty than in the Georgia-Alabama field, where the deposits are isolated pockets. With the rapid exhaustion of the latter deposits Arkansas must be looked to for supplying the demand for this ore. Other deposits of the ore may be discovered in the United States, but none of importance are at present known. These Arkansas deposits, therefore, become highly important to the aluminum and alum industries. They will be described at length in a paper by Dr. C. W. Hayes soon to be issued.

QUICKSILVER.

By EDWARD W. PARKER.

PRODUCTION.

The production of quicksilver in the United States in 1899 amounted to 30,454 flasks of 76½ pounds, valued at \$1,452,745, against 31,092 flasks, valued at \$1,188,627, in 1898. The amount of quicksilver produced in 1899 was less than in 1895, 1896, or 1898, while the value exceeded that of any year since 1882, when the product was 52,732 flasks, or about 70 per cent more than in 1899. The value of the 52,732 flasks produced in 1882 was \$1,487,042, only \$34,297 more than that of the 30,454 flasks produced in 1899, a difference of less than 2½ per cent. The past year was one of steadily advancing prices from January 1 to December 31. When the year opened the quotations at San Francisco were \$42 per flask for local delivery and \$37.50 for export. At the close of the year the price for local delivery was \$51.50 and for export \$47 per flask. These were the highest prices obtained since 1890.

The most interesting feature of the year, apart from the notable increase in value, was the development of the cinnabar deposits in Brewster County, Texas, which resulted in a production from that locality of approximately 1,000 flasks. All of the production, with this exception, was from California. In the following table is shown the amount and value of the quicksilver produced in the United States since 1880. The entire product during this period was from California, with the exception of 65 flasks from Oregon in 1887 and the 1,000 flasks from Texas in 1899:

Amount and value of quicksilver produced in the United States from 1880 to 1899.

Year.	Flasks of 76½ pounds.	Value.
1880.....	59,926	\$1,797,780
1881.....	60,851	1,764,679
1882.....	52,732	1,487,042
1883.....	46,725	1,253,632
1884.....	31,913	936,327
1885.....	32,073	797,189

Amount and value of quicksilver produced in the United States from 1880 to 1899—Cont'd.

Year.	Flasks of 76½ pounds.	Value.
1886.....	29,981	\$1,060,000
1887.....	33,825	1,429,000
1888.....	33,250	1,413,125
1889.....	26,484	1,190,500
1890.....	22,926	1,203,615
1891.....	22,904	1,036,386
1892.....	27,993	1,245,689
1893.....	30,164	1,108,527
1894.....	30,416	934,000
1895.....	36,104	1,337,131
1896.....	30,765	1,075,449
1897.....	26,648	993,445
1898.....	31,092	1,188,627
1899.....	30,454	1,452,745

CALIFORNIA.

In the following table is shown the production of quicksilver in California, by mines, each year since 1850. In the half century covered by this table the grand total of production has amounted to 1,831,022 flasks of 76½ pounds net, an average of 36,620 flasks per year. Of this total the New Almaden mine in Santa Clara County has produced a little over 50 per cent. The period of greatest activity in the quicksilver mines of California was from 1875 to 1882, when the output averaged 64,000 flasks a year. Since 1882 the product has averaged only a little more than 30,000 flasks annually. In the statistics for 1899 the production of "various mines" includes that of Chicago mine, Lake County; Manhattan and Vallejo mines, Napa County, and Santa Clara and Sunderland mines, San Luis Obispo County.

Total product of quicksilver in California.

[Flasks of 76½ pounds, net.]

Year.	New Almaden.	New Idria.	Redington.	Sulphur Bank.	Great Western.	Napa Con- solidated.
1850.....	7,723	.....	.....	.....	.....	.....
1851.....	27,779	.....	.....	.....	.....	.....
1852.....	15,901	.....	.....	.....	.....	.....
1853.....	22,284	.....	.....	.....	.....	.....
1854.....	30,004	.....	.....	.....	.....	.....

QUICKSILVER.

275

Total product of quicksilver in California—Continued.

[Flasks of 76½ pounds, net.]

Year.	New Almaden.	New Idria.	Redington.	Sulphur Bank.	Great Western.	Napa Consolidated.
1855.....	29,142					
1856.....	27,138					
1857.....	28,204					
1858.....	25,761					
1859.....	1,294					
1860.....	7,061					
1861.....	34,429					
1862.....	39,671		444			
1863.....	32,803		852			
1864.....	42,489		1,914			
1865.....	47,194	(a)	3,545			
1866.....	35,150	6,525	2,254			
1867.....	24,461	11,493	7,862			
1868.....	25,628	12,180	8,686			
1869.....	16,898	10,315	5,018			
1870.....	14,423	9,888	4,546			
1871.....	18,568	8,180	2,128			
1872.....	18,574	8,171	3,046			
1873.....	11,042	7,735	3,294		340	
1874.....	9,084	6,911	6,678	573	1,122	
1875.....	13,648	8,432	7,513	5,372	3,384	
1876.....	20,549	7,272	9,183	8,367	4,322	573
1877.....	23,996	6,316	9,399	10,993	5,856	2,229
1878.....	15,852	5,138	6,686	9,465	4,963	3,049
1879.....	20,514	4,425	4,516	9,249	6,333	3,605
1880.....	23,465	3,209	2,139	10,706	6,442	4,416
1881.....	26,060	2,775	2,194	11,152	6,241	5,552
1882.....	28,070	1,953	2,171	5,014	5,179	6,842
1883.....	29,000	1,606	1,894	2,612	3,869	5,890
1884.....	20,000	1,025	881	890	3,292	4,307
1885.....	21,400	1,144	385	1,296	3,469	3,506
1886.....	18,000	1,406	409	1,449	1,949	5,247
1887.....	20,000	1,890	673	1,490	1,446	5,574
1888.....	18,000	1,320	126	2,164	625	5,024
1889.....	13,100	980	812	2,283	556	4,590
1890.....	12,000	977	505	1,608	1,334	3,429
1891.....	8,200	792	442	1,375	1,844	4,454
1892.....	5,563	848	728	1,393	5,867	5,680

a Production from 1866 to 1866 was 17,456 flasks; no yearly details obtainable; they are included in the product of "Various mines."

MINERAL RESOURCES.

Total product of quicksilver in California—Continued.

[Flasks of 76½ pounds, net.]

Year.	New Almaden.	New Idria.	Redington.	Sulphur Bank.	Great Western.	Napa Consolidated.
1893.....	6,614	869	1,012	1,200	3,187	6,120
1894.....	7,235	1,005	1,200	348	5,341	4,930
1895.....	7,050	1,100	163	2,703	5,023	5,400
1896.....	6,200	1,335	1,906	1,236	2,303	5,000
1897.....	4,700	3,605	1,550	.....	2,709	6,200
1898.....	5,875	5,000	1,012	.....	1,150	6,850
1899.....	4,435	4,780	882	336	1,545	5,850
Total..	972,231	150,600	108,648	93,274	89,691	114,317

Year.	Great Eastern.	Mirabel.	Ætna.	Altoona.	Abbott.	Various mines.	Total yearly production of California mines.
1850.....	7,723
1851.....	27,779
1852.....	4,099	20,000
1853.....	22,284
1854.....	30,004
1855.....	3,858	33,000
1856.....	2,862	30,000
1857.....	28,204
1858.....	5,239	31,000
1859.....	11,706	13,000
1860.....	2,939	10,000
1861.....	571	35,000
1862.....	1,885	42,000
1863.....	6,876	40,531
1864.....	3,086	47,489
1865.....	2,261	53,000
1866.....	2,621	46,550
1867.....	3,184	47,000
1868.....	1,234	47,728
1869.....	1,580	33,811
1870.....	1,220	30,077
1871.....	2,810	31,686
1872.....	1,830	31,621
1873.....	5,231	27,642
1874.....	3,388	27,756
1875.....	412	11,489	50,250
1876.....	387	22,063	72,716

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Total product of quicksilver in California—Continued.

[Flasks of 76½ pounds, net.]

Year.	Great Eastern.	Mirabel.	Ætna.	Altoona.	Abbott.	Various mines.	Total yearly production of California mines.
1877.....	505					20,101	79,395
1878.....	1,366					17,361	63,880
1879.....	1,455					23,587	73,684
1880.....	1,279					8,270	59,926
1881.....	1,065					5,812	60,851
1882.....	2,124					1,379	52,732
1883.....	1,669					185	46,725
1884.....	332					1,186	31,913
1885.....	446					427	32,073
1886.....	735					786	29,981
1887.....	689	1,543				520	^a 33,825
1888.....	1,151	3,848				992	33,250
1889.....	1,345	1,874				924	26,464
1890.....	1,046	1,290				737	22,926
1891.....	1,660	1,686				2,451	22,904
1892.....	1,630	3,208	1,592		672	812	27,993
1893.....	1,445	5,211	3,795		133	578	30,164
1894.....	1,368	4,214	3,575		1,200		30,416
1895.....	1,813	3,900	3,300	3,926	1,223	466	36,067
1896.....	1,126	1,114	3,800	4,205	1,200	1,340	30,765
1897.....	^b 1,538	375	3,600	838	475	1,101	26,691
1898.....	1,704		3,450	4,032	500	1,519	31,092
1899.....	2,119	543	3,800	3,076	500	1,588	29,454
Total..	30,409	28,806	26,912	16,077	5,903	194,154	1,831,022

^a Includes 65 flasks from Oregon.^b Including Mount Jackson.

To the advancing market in 1899 is due an increased activity in prospecting for quicksilver deposits, the rehabilitation of old mines, temporarily shut down, and the formation of a number of new companies organized for the ostensible purpose of operating quicksilver mines in different parts of the State. In Colusa County a new furnace and eighteen new condensers were installed at the Buckeye mine, which has not reported any production for a number of years. Steps have been taken to reopen the old Amador mine, in Eldorado County, which was abandoned at least ten years ago. The Crystal Quicksilver Mining Company is reported to have opened up a rich ore body in Lake County, and the Black Butte Quicksilver Mining Company is opening a promising property in the same county. The California Quicksilver Mines Company has been incorporated under the laws of

West Virginia to operate mines in Napa County; it owns 1,294 acres and has opened up four mines. The Twin Peaks Quicksilver Mining Company has been incorporated to operate in the same county. Twenty-one quicksilver mining locations are reported to have been made in Santa Clara County. The Bradford Quicksilver Mining Company, of San Jose, has been organized, and the old Guadalupe mine, idle for the last fifteen years, has been put in order for resumption of operations. In Solano County, the old St. John mine, 5 miles from Vallejo, was equipped with new machinery and is reported as one of the expected producers for 1900. From 1873 to 1880 it was in operation, and produced 11,528 flasks. In Sonoma County, the old Cloverdale mine was reopened late in the year, but did not ship any quicksilver before the close of the year. The Siskiyou Quicksilver Mining Company is reported to have struck a good lead of ore in Siskiyou County, and a party of prospectors are said to have opened a promising location in Yolo County. The Crown Point Quicksilver Mining Company of San Francisco was organized early in 1900.

TEXAS.

Public attention was first directed to what now promises to be one of the most important quicksilver-producing districts of the United States, by Prof. William P. Blake, in a paper presented before the American Institute of Mining Engineers¹ in 1895. The reports of the Texas Geological Survey and the monograph of Dr. George F. Becker upon the quicksilver deposits of the United States contain no account of this locality. According to Professor Blake the location of the deposit was made early in 1894 by Mr. George W. Wanless, of Jimenez, Mexico, and Mr. Charles Allen, of Socorro, New Mexico, who were led to an exploration of the region by reports of Mexicans having obtained some rich cinnabar in the mountains of the "Great Bend" section of Texas. Professor Blake, in company with Mr. James P. Chase, of Socorro, visited the locality in August, 1894.

The deposits are located in Brewster County, about 68 miles in a direct line southwest from the station of Marathon on the Southern Pacific Railroad. The country is sparsely populated and presents few attractions for immigration apart from the mineral prospects. Professor Blake reports the cinnabar as occurring in massive limestone (designated by Mr. Robert T. Hill of the United States Geological Survey as the *Caprina* limestone of the Cretaceous formation), and in a siliceous shale and a white earthy, clay-like rock; also, in part, in a true breccia of grayish white siliceous shale, dense and compact, embedded and cemented in a red and chocolate-colored ferruginous mass, also dense and hard. The cinnabar is more generally crystalline

¹Trans. Am. Inst. Min. Eng., Vol. XXV, 1895, p. 68

than amorphous and is found in distinctly separate grains and small but brilliant rhomboidal crystals having the brilliant red color characteristic of vermillion. In addition to these crystalline granules which occur in the brecciated shale and in the more massive white rock, there are amorphous bunches of cinnabar found in the shales and in the limestone and breccia.

Scarcity of fuel and water, as well as the distance from transportation, were pointed out by Professor Blake as difficulties in the way of working the deposits and concentrating or smelting the ore, and to these difficulties is probably due the length of time (five years) which has elapsed since the deposits were located and before any marketable product was obtained.

Mr. H. W. Turner, of the United States Geological Survey, visited the region (now termed the Terlingua Quicksilver Mining District) in the spring of the present year (1900). Mr. Turner also notes the difficulties presented in the scarcity of wood and water. The chief firewood at present is mesquite, but even this is scarce, and it is not suitable for mine timbering. At the time of Mr. Turner's visit a considerable amount of development work had been done and the ore extracted had yielded about 1,000 flasks of quicksilver. All of this ore had come from surface workings or shallow shafts, and the prospecting work had not been carried far enough along to determine the depth of the workable ore bodies. Mr. Turner states, however, that as the limestone in which the cinnabar occurs is at this point at least 1,000 feet in thickness, and as the cinnabar undoubtedly comes from a source beneath the limestone, it is more than probable that the ore bodies will be found to a depth equal to the thickness of the limestone, with a good chance of their extending still deeper.

The cinnabar mines lie in a comparatively limited area, 4 miles long by 2 wide, though it is probable that the mineralized area will be found to extend a mile farther both ways. The general trend of the main lodes is in an easterly and westerly direction. The limestone of the district contains numerous brown veins composed of calcite and oxide of iron. The cinnabar occurs in these veins as stringers or pockets, many of the veins showing no trace of mercury, and even when cinnabar is present it often can not be seen until the rock is broken, owing to the discolored weathering of the surface.

In addition to cinnabar, mercury occurs in the native form—notably in what has been named the McKinley lode—and as a white coating and as yellow-green crystals. Prof. S. L. Penfield has identified the white coating as calomel, or chloride of mercury (Hg_2Cl_2), and the greenish crystals as oxychloride of mercury, a new mineral species to which Mr. Turner has suggested the name of terlinguaite.

Among the mines which are now being worked are the Lindheim & Dewees, owned by Louis Lindheim and Dell Dewees, of Del Rio;

the Mariposa, belonging to Normand & Galley, of Presidio; the California, owned by a California company, and the Excelsior, owned by J. J. Hess, of Marathon. At the time of Mr. Turner's visit the ore was being retorted at two points. At one place only a single retort was worked and at the other place there were four. Only the high-grade ore was being retorted. Since that time a furnace has been constructed by the Marfa and Mariposa Mining Company, and in Mr. Turner's opinion the output for 1900 will be considerably more than that of 1899.

IMPORTS.

In the following table is given a statement of the imports of quicksilver from 1867 to 1899:

Quicksilver imported and entered for consumption in the United States, 1867 to 1899, inclusive.

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
June 30—	Pounds.		June 30—	Pounds.	
1867.....		\$15,248	1884.....	136,615	\$44,035
1868.....	152	68	1885.....	257,659	90,416
1869.....		11	Dec. 31—		
1870.....	239,223	107,646	1886.....	629,888	249,411
1871.....	304,965	137,332	1887.....	419,934	171,431
1872.....	370,353	189,943	1888.....	132,850	56,997
1873.....	99,898	74,146	1889.....	341,514	162,064
1874.....	51,202	52,093	1890.....	802,871	445,807
1875.....	6,870	20,957	1891.....	123,966	61,355
1876.....	78,902	50,164	1892.....	96,318	40,133
1877.....	38,250	19,558	1893.....	41,772	17,400
1878.....	294,207	135,178	1894.....	7	6
1879.....	519,125	217,707	1895.....	15,001	7,008
1880.....	116,700	48,463	1896.....	305	118
1881.....	138,517	57,733	1897.....	45,539	20,147
1882.....	597,898	233,057	1898.....	81	51
1883.....	1,552,738	593,367	1899.....	131	83

EXPORTS.

The exports of quicksilver from the United States for the last twenty years are shown in the following table. The quantities are expressed in flasks of 76½ pounds net. Nearly all of the quicksilver exported is shipped from San Francisco.

Exports of quicksilver from the United States since 1880.

Year.	Flasks.	Value.
1880.....	37, 210	\$1, 119, 952
1881.....	35, 107	1, 025, 299
1882.....	33, 875	988, 454
1883.....	30, 072	808, 353
1884.....	7, 370	199, 685
1885.....	6, 802	209, 753
1886.....	8, 091	204, 956
1887.....	11, 394	441, 112
1888.....	10, 684	406, 899
1889.....	5, 111	213, 717
1890.....	2, 069	93, 192
1891.....	3, 714	145, 502
1892.....	3, 518	133, 626
1893.....	16, 631	542, 410
1894.....	14, 408	397, 528
1895.....	15, 542	482, 085
1896.....	19, 944	618, 437
1897.....	13, 173	394, 549
1898.....	12, 830	440, 587
1899.....	16, 517	609, 586

PRICES.

The highest and lowest prices for quicksilver in London and San Francisco during a period of fifty years is shown in the following table:

Highest and lowest prices of quicksilver during the last fifty years.

[Per flask.]

Year.	Price in San Francisco.		Price in London.					
	Highest.	Lowest.	Highest.			Lowest.		
			£	s.	d.	£	s.	d.
1850.....	\$114. 75	\$84. 15	15	0	0	13	2	6
1851.....	76. 50	57. 35	13	15	0	12	5	0
1852.....	61. 20	55. 45	11	10	0	9	7	6
1853.....	55. 45	55. 45	8	15	0	8	2	6
1854.....	55. 45	55. 45	7	15	0	7	5	0
1855.....	55. 45	51. 65	6	17	6	6	10	0
1856.....	51. 65	51. 65	6	10	0	6	10	0
1857.....	53. 55	45. 90	6	10	0	6	10	0
1858.....	49. 75	45. 90	7	10	0	7	5	0
1859.....	76. 50	49. 75	7	5	0	7	0	0
1860.....	57. 35	49. 75	7	0	0	7	0	0
1861.....	49. 75	34. 45	7	0	0	7	0	0
1862.....	38. 25	34. 45	7	0	0	7	0	0
1863.....	45. 90	38. 25	7	0	0	7	0	0
1864.....	45. 90	45. 90	9	0	0	7	10	0
1865.....	45. 90	45. 90	8	0	0	7	17	6
1866.....	57. 35	45. 90	8	0	0	6	17	0
1867.....	45. 90	45. 90	7	0	0	6	18	0
1868.....	45. 90	45. 90	6	17	0	6	18	0
1869.....	45. 90	45. 90	6	17	0	6	18	0
1870.....	68. 85	45. 90	10	0	0	6	18	0
1871.....	68. 85	57. 35	12	0	0	9	0	0
1872.....	66. 95	65. 00	13	0	0	10	0	0
1873.....	91. 80	68. 85	20	0	0	12	10	0
1874.....	118. 55	91. 80	26	0	0	19	0	0
1875.....	118. 55	49. 75	24	0	0	9	17	6
1876.....	53. 55	34. 45	12	0	0	7	17	6
1877.....	44. 00	30. 60	9	10	0	7	2	6
1878.....	35. 95	29. 85	7	5	0	6	7	6
1879.....	34. 45	25. 25	8	15	0	5	17	6
1880.....	34. 45	27. 55	7	15	0	6	7	6
1881.....	31. 75	27. 90	7	0	0	6	2	6
1882.....	29. 10	27. 35	6	5	0	5	15	0
1883.....	28. 50	26. 00	5	17	6	5	5	0
1884.....	35. 00	26. 00	6	15	0	5	2	6

Highest and lowest prices of quicksilver during the last fifty years—Continued.

[Per flask.]

Year.	Price in San Francisco.		Price in London.			
	Highest.	Lowest.	Highest.		Lowest.	
			£	s. d.	£	s. d.
1885.....	\$33.00	\$28.50	6	15 0	5	10 0
1886.....	39.00	32.00	7	10 0	5	16 3
1887.....	50.00	36.50	11	5 0	6	7 6
1888.....	47.00	36.00	10	0 0	6	12 6
1889.....	50.00	40.00	9	15 0	7	10 0
1890.....	58.00	47.00	10	10 0	9	1 0
1891.....	51.00	39.50	8	12 6	7	5 0
1892.....	47.50	41.50	7	10 0	6	2 6
1893.....	43.50	30.00	6	17 6	6	2 0
1894.....	37.00	28.50	6	15 0	5	7 6
1895.....	41.00	35.90	7	10 0	6	10 0
1896.....	40.00	36.00	7	7 6	6	7 6
1897.....	40.50	36.50	7	7 6	6	12 6
1898.....	40.00	30.00	7	15 0	7	0 0
1899.....	51.50	37.50	9	12 6	7	18 9
Extreme range.....	118.55	25.25	26	0 0	5	2 6

In the following table is shown the highest and lowest prices of quicksilver at San Francisco and London for each month during 1899:

Highest and lowest prices for quicksilver in 1899, by months.

[Per flask of 76½ pounds, net.]

Month.	In San Francisco.		In London.			
	Highest. a	Lowest. b	Highest.		Lowest.	
			£	s. d.	£	s. d.
January.....	\$42.00	\$37.50	7	19 0	7	18 9
February.....	42.00	38.50	8	4 0	8	4 0
March.....	42.50	39.00	8	4 0	8	2 6
April.....	42.50	38.00	8	1 3	7	17 6
May.....	42.00	38.50	8	2 6	8	0 0
June.....	43.00	38.50	8	4 0	8	2 6
July.....	43.50	39.00	8	7 6	8	5 0
August.....	43.50	39.50	8	10 0	8	7 6
September.....	46.00	40.50	8	12 7	8	12 6
October.....	47.00	41.00	8	17 6	8	12 6
November.....	50.00	45.00	9	10 0	9	5 0
December.....	51.50	45.50	9	12 6	9	10 0

a For local delivery.

b For export.

NICKEL AND COBALT.

PRODUCTION.

The domestic supply of nickel and cobalt in 1899 returned to about the product of 1897, after a considerable decrease for 1898. As before, nickel and cobalt remained by-products from the smelting of lead ores at Mine Lamotte, Missouri. The production of cobalt oxide increased correspondingly, from 6,247 pounds in 1898 to 10,230 pounds in 1899. Continued efforts are being made to develop the nickel from Oregon, and these will probably be successful with the future cheap means of transportation. The bulk of the nickel used in the United States continues to come from the well-known deposits of Sudbury, Canada.

The following tables show the production and importation to the close of 1899:

Production of nickel from domestic ores in the United States during the years 1887 to 1899.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1887.....	205,566	\$133,200
1888.....	204,328	127,632
1889.....	252,663	151,598
1890.....	223,488	134,093
1891.....	118,498	71,099
1892.....	92,252	50,739
1893.....	49,399	22,197
1894.....	9,616	3,269
1895.....	10,302	3,091
1896.....	17,170	4,464
1897.....	23,707	7,823
1898.....	11,145	3,956
1899.....	22,541	8,566

Production of cobalt oxide in the United States, 1869 to 1899.

Year.	Quantity.	Year.	Quantity.	Year.	Quantity.
	<i>Pounds.</i>		<i>Pounds.</i>		<i>Pounds.</i>
1869.....	811	1880.....	7,251	1891.....	7,200
1870.....	3,854	1881.....	8,280	1892.....	7,869
1871.....	5,086	1882.....	11,653	1893.....	8,422
1872.....	5,749	1883.....	1,096	1894.....	6,763
1873.....	5,128	1884.....	2,000	1895.....	14,458
1874.....	4,145	1885.....	8,423	1896.....	10,700
1875.....	3,441	1886.....	8,689	1897.....	19,520
1876.....	5,162	1887.....	^a 18,340	1898.....	6,247
1877.....	7,328	1888.....	8,491	1899.....	10,230
1878.....	4,508	1889.....	13,955		
1879.....	4,376	1890.....	6,788		

^a Including cobalt oxide in ore and matte.

IMPORTS AND EXPORTS.

In the following tables are given the statistics of the imports of cobalt oxide and of nickel into the United States from 1868 to 1899:

Cobalt oxide imported and entered for consumption in the United States, 1868 to 1899.

Year ending—	Oxide.		Year ending—	Oxide.	
	Quantity.	Value.		Quantity.	Value.
June 30—	<i>Pounds.</i>		June 30—	<i>Pounds.</i>	
1868.....		\$7,208	1885.....	16,162	\$28,138
1869.....		2,330	Dec. 31—		
1870.....		5,019	1886.....	19,366	29,543
1871.....		2,766	1887.....	26,882	39,396
1872.....		4,920	1888.....	27,446	46,211
1873.....	1,480	4,714	1889.....	41,455	82,332
1874.....	1,404	5,500	1890.....	33,338	63,202
1875.....	678	2,604	1891.....	23,643	43,188
1876.....	4,440	11,180	1892.....	32,833	60,067
1877.....	19,752	11,066	1893.....	28,884	42,694
1878.....	2,860	8,693	1894.....	24,020	29,857
1879.....	7,531	15,208	1895.....	36,155	39,839
1880.....	9,819	18,457	1896.....	27,180	36,212
1881.....	21,844	13,837	1897.....	24,771	34,773
1882.....	17,758	12,764	1898.....	33,731	49,245
1883.....	13,067	22,323	1899.....	46,791	68,847
1884.....	25,963	43,611			

NICKEL AND COBALT.

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Nickel imported and entered for consumption in the United States, 1868 to 1899.

Year ending—	Nickel.		Nickel oxide, alloy of nickel with copper, and nickel matte.		Total value.
	Quantity.	Value.	Quantity.	Value.	
June 30—	Pounds.		Pounds.		
1868.....		\$118,058			\$118,058
1869.....		134,327			134,327
1870.....		99,111			99,111
1871.....	17,701	48,133	4,438	\$3,911	52,044
1872.....	28,140	27,144			27,144
1873.....	2,842	4,717			4,717
1874.....	3,172	5,883			5,883
1875.....	1,255	3,157	12	36	3,193
1876.....			156	10	10
1877.....	5,978	9,522	716	824	10,346
1878.....	7,486	8,837	8,518	7,847	16,684
1879.....	10,496	7,829	8,314	5,570	13,399
1880.....	38,276	25,758	61,869	40,311	66,069
1881.....	17,933	14,503	135,744	107,627	122,130
1882.....	22,906	17,924	177,822	125,736	143,660
1883.....	19,015	13,098	161,159	119,386	132,484
1884.....			<i>a</i> 194,711	129,733	129,733
1885.....			105,603	64,166	64,166
Dec. 31—					
1886.....			277,112	141,546	<i>b</i> 141,546
1887.....			439,037	205,232	<i>c</i> 205,232
1888.....			316,895	138,290	<i>d</i> 138,290
1889.....			367,288	156,331	<i>e</i> 156,331
1890.....	<i>f</i> 566,571	260,665	247,299	115,614	376,279
1891.....	355,455	172,476	<i>g</i> 10,245,200	148,687	321,163
1892.....			<i>h</i> 4,487,890	428,062	428,062
1893.....			<i>h</i> 12,427,986	386,740	386,740
1894.....			<i>h</i> 9,286,733	310,581	310,581
1895.....			<i>h</i> 20,355,749	629,910	629,910
1896.....			<i>h</i> 23,718,411	620,425	620,425
1897.....			<i>h</i> 27,821,232	781,483	781,483
1898.....			<i>h</i> 60,090,240	1,534,262	1,534,262
1899.....			<i>h</i> 44,479,841	1,216,253	1,216,253

a Including metallic nickel.*b* Including \$465 worth of manufactured nickel.*c* Including \$879 worth of manufactured nickel.*d* Including \$2,281 worth of manufactured nickel.*e* Including \$131 worth of manufactured nickel.*f* Classified as nickel, nickel oxide, alloy of any kind in which nickel is the element or material of chief value.*g* Classified as nickel and nickel matte.*h* Includes all nickel imports except manufactures; nearly all of this is nickel in matte from Canada, containing about 20 per cent nickel.

Exports of nickel oxide and matte from the United States from 1894 to 1899.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1894 ^a	1, 235, 588	\$247, 568
1895.....	1, 061, 285	239, 897
1896.....	2, 756, 604	606, 833
1897.....	4, 255, 558	997, 391
1898.....	5, 657, 620	1, 359, 609
1899.....	5, 004, 377	1, 151, 454

^a Latter six months; not separately classified prior to July 1, 1894.

FOREIGN PRODUCTION.

In view of the fact that the United States obtains its chief supply of nickel from Canada, the following statement of production in that country since 1889 will be of interest. It should be observed that in this table the statistics are for metallic nickel, while in the table of imports into the United States the quantity of nickel matte is given.

Outside of Canada the principal producers of nickel are France and Germany. Statements of the production in these countries from 1886 to 1897 are appended:

Production of nickel in Canada from 1889 to 1899.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1889.....	830, 477	\$498, 286
1890.....	1, 435, 742	933, 232
1891.....	4, 626, 627	2, 775, 976
1892.....	2, 413, 717	1, 399, 956
1893.....	3, 992, 982	2, 076, 351
1894.....	4, 907, 430	2, 061, 120
1895.....	3, 888, 525	1, 360, 984
1896.....	3, 397, 113	1, 188, 990
1897.....	3, 997, 746	1, 399, 137
1898.....	5, 517, 690	1, 820, 838
1899.....	5, 744, 000	2, 067, 840

NICKEL AND COBALT.

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Production of nickel in France from 1886 to 1898.

Year.	Quantity.		Value.
	Metric tons.	Francs.	
1886.....	30	180,000	\$34,200
1887.....	30	180,000	34,200
1888.....	30	210,000	39,900
1889.....	330	1,710,000	324,900
1890.....	330	1,670,000	317,300
1891.....	330	1,680,000	319,200
1892.....	1,244	6,182,000	1,174,580
1893.....	2,045	6,188,000	1,175,720
1894.....	1,545	6,188,000	1,175,720
1895.....	1,545	5,438,000	1,033,220
1896.....	1,545	4,607,000	875,330
1897.....	1,245	3,707,500	704,425
1898.....	1,540	4,600,000	887,800

Production of nickel in Germany (Prussia) from 1886 to 1898.

Year.	Quantity.	Value.
	<i>Metric tons.</i>	
1886.....	169	\$179,930
1887.....	169	179,930
1888.....	288	273,030
1889.....	282	279,680
1890.....	434	436,430
1891.....	594	644,480
1892.....	747	698,630
1893.....	893	774,630
1894.....	522	449,350
1895.....	698	575,890
1896.....	822	666,900
1897.....	898	710,980
1898.....	1,108	670,482

ANTIMONY.

By EDWARD W. PARKER.

PRODUCTION.

Including the antimony contained in hard or antimonial lead, the amount of this metal obtained from ores of domestic production in 1899 was 234 short tons, valued at \$43,600. If to this product is added the amount of antimony contained in foreign ores smelted in the United States, the total amount of metal produced in this country in 1899 is estimated to have been 1,275 short tons, having a total value of \$251,875. In making this estimate the ore imported (which for 1899 is reported by the Bureau of Statistics of the Treasury Department at 3,968,654 pounds, or 1,984 short tons) is assumed to contain an average of 52½ per cent of available metal, and the value is computed at the average price for the year. In addition to the antimony produced in the United States we imported in 1899 2,990,915 pounds, or 1,495 short tons, of metal, crude and regulus, valued at \$241,685, this value being at shipping port, exclusive of freight and import duties. The total domestic consumption of antimony in 1899, assuming that stocks at the beginning and the close of the year were about equal, amounted approximately to 2,770 short tons, the total value of which, based on the average price for the year, was about \$550,000.

Compared with 1898, the amount of antimony produced from foreign and domestic ores in the United States in 1899 shows an increase of 155 short tons, with an increase of \$67,825 in value. Prices averaged about 2 cents per pound higher during 1899 than in 1898, indicating the extent to which the antimony market was affected by the industrial revival of 1899. The total domestic consumption increased from 2,272 short tons in 1898 to 2,770 tons in 1899, a gain of nearly 500 tons, or about 22 per cent. The amount of antimony obtained from domestic ores, including that contained in antimonial lead, is less than 10 per cent of the total consumption.

The ore of domestic production in 1899 was mined principally in California and Idaho. Small amounts were produced in Arkansas and Nevada, but no output was reported from either Montana or Utah. The discovery of an extensive deposit of antimony ore has been reported in Kittitas County, Washington, from which shipments were expected to be made before the close of the present year.

In the following table is shown the annual production of antimony in the United States since 1880:

Production of antimony in the United States since 1880.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	<i>Short tons.</i>			<i>Short tons.</i>	
1880.....	50	\$10,000	1891.....	278	\$47,007
1881.....	50	10,000	1892:		
1882.....	60	12,000	Metallic	150	} 56,466
1883.....	60	12,000	Ore	380	
1884.....	60	12,000	1893.....	250	45,000
1885.....	50	10,000	1894.....	200	36,000
1886.....	35	7,000	1895.....	α 450	68,000
1887.....	75	15,000	1896.....	α 601	84,290
1888.....	100	20,000	1897.....	α 844	121,944
1889.....	115	28,000	1898.....	α 1,120	184,050
1890.....	129	40,756	1899.....	α 1,275	251,875

α Principally from imported ores, and includes antimony contained in antimonial lead.

CONSUMPTION.

In the following table is presented a statement of the consumption of antimony in the United States since 1880. The imported ore is estimated at 52½ per cent metallic antimony, and "crude and regulus" is taken to be equivalent to metal.

Estimated consumption of antimony in the United States since 1880.

Year.	From domestic ores.	From imported ores.	Imported crude or regulus.	Total.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1880.....	50	7	1,010	1,067
1881.....	50	221	904	1,175
1882.....	60	292	1,263	1,615
1883.....	60	183	1,532	1,775
1884.....	60	61	890	1,011
1885.....	50	57	1,290	1,397
1886.....	35	58	1,499	1,592
1887.....	75	95	1,277	1,447
1888.....	100	18	1,407	1,525
1889.....	115	38	1,338	1,491
1890.....	129	160	1,658	1,947
1891.....	278	377	1,309	1,964
1892.....	150	50	1,975	2,175
1893.....	250	30	1,390	1,670
1894.....	200	100	1,327	1,627

Estimated consumption of antimony in the United States since 1880—Continued.

Year.	From domestic ores.	From imported ores.	Imported crude or regulus.	Total.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1895.....	<i>a</i> 275	<i>a</i> 175	1,750	2,200
1896.....	<i>a</i> 291	<i>a</i> 310	1,288	1,889
1897.....	<i>a</i> 245	<i>a</i> 599	1,141	1,985
1898.....	<i>a</i> 250	<i>a</i> 870	1,052	2,172
1899.....	234	1,041	1,495	2,770

^a Separation estimated. All antimony smelted, whether from domestic or foreign ores, was reported as of domestic production.

An interesting feature presented in the foregoing table is the increased amount of antimony obtained from foreign ores during the last few years. This has been due to the removal of the principal smelting works from San Francisco to Staten Island. This was found to be necessary in order to obtain a more regular supply of ore than was to be secured from the localities developed in the United States. The removal was accomplished in 1894, since which time the production of regulus from imported ores has steadily increased.

IMPORTS.

The following table, compiled from the records of the Bureau of Statistics of the Treasury Department, shows the amount and value of the antimony ore and metal imported into the United States since 1867. It will be observed that during the last twenty years the amount of crude antimony and regulus imported has been notably regular, with an increasing tendency, until the last few years. In the first five years of this period the imports averaged about 2,260,000 pounds annually. In the five years from 1885 to 1889, inclusive, the average imports were 2,724,000 pounds a year. In the next five years the average had increased to 3,064,000 pounds a year, while in the last five years the average has declined to 2,690,000 pounds. The decrease in the last five years has been due to the larger imports of ore which was smelted in this country. The first year that any amount of imported ore is recorded is for 1875, when 6,460 pounds, or a little over 3 short tons, were received. In the five years from 1875 to 1879 the total amount of ore imported was less than 50 tons. During the next fifteen years the total amount of ore imported was 6,650,550 pounds, or about 3,325 short tons, an average of 222 tons a year. From 1895 to 1899 the imports have amounted to 13,286,500 pounds, or 6,643 short tons—nearly double the total imports during the preceding fifteen years. In the last three years the imports of ore have amounted to 11,437,062 pounds, about one and one-third times the aggregate imports from 1875 to 1896, inclusive.

These figures indicate that all of the normal increase in consumption during the last few years has been supplied by metal smelted in the United States, although the ores from which it was obtained were principally the product of foreign mines.

Antimony and antimony ore imported and entered for consumption in the United States, from 1867 to 1899.

Year ending—	Crude and regulus.		Ore.		Total value.
	Quantity.	Value.	Quantity.	Value.	
	Pounds.		Pounds.		
June 30, 1867.....	.....	\$63,919	.....	.....	\$63,919
1868.....	1,033,336	83,822	.....	.....	83,822
1869.....	1,345,921	129,918	.....	.....	129,918
1870.....	1,227,429	164,179	.....	.....	164,179
1871.....	1,015,039	148,264	.....	\$2,364	150,628
1872.....	1,933,306	237,536	.....	3,031	240,567
1873.....	1,166,321	184,498	.....	2,941	187,439
1874.....	1,253,814	148,409	.....	203	148,612
1875.....	1,238,223	131,360	6,460	609	131,969
1876.....	946,809	119,441	8,321	700	120,141
1877.....	1,115,124	135,317	20,001	2,314	137,631
1878.....	1,256,624	130,950	20,351	1,259	132,209
1879.....	1,380,212	143,099	34,542	2,341	145,440
1880.....	2,019,389	265,773	25,150	2,349	268,122
1881.....	1,808,945	253,054	841,730	18,199	271,253
1882.....	2,525,838	294,234	1,114,699	18,019	312,253
1883.....	3,064,050	286,892	697,244	11,254	298,146
1884.....	1,779,337	150,435	231,360	6,489	156,924
1885.....	2,579,840	207,215	215,913	7,497	214,712
Dec. 31, 1886.....	2,997,985	202,563	218,366	9,761	212,324
1887.....	2,553,284	169,747	362,761	8,785	178,532
1888.....	2,814,044	248,015	68,040	2,178	250,193
1889.....	2,676,130	304,711	146,309	5,568	310,279
1890.....	3,315,659	411,960	611,140	29,878	441,838
1891.....	2,618,941	327,307	1,433,531	36,232	363,539
1892.....	3,950,864	392,761	192,344	7,338	400,099
1893.....	2,780,432	243,341	116,495	5,253	248,594
1894.....	2,653,487	193,988	375,468	18,805	212,793
1895.....	3,499,901	223,968	668,610	14,718	238,686
1896.....	2,576,371	158,975	1,180,828	21,402	180,377
1897.....	2,282,245	143,370	3,719,186	55,400	198,770
1898.....	2,103,599	148,671	3,749,222	50,256	198,927
1899.....	2,990,915	241,685	3,968,654	47,427	289,112

^a Includes \$737, value of ground antimony for which no quantity was given.

PRICES.

The upward tendency of prices which began in 1898 continued during the first few months in 1899 and remained steady during the remainder of the year. The average prices throughout 1899 were from 2 to 4 cents higher than in 1898 and reached the highest point recorded since 1892.

The following tables show, by months and years, the ruling prices of the several brands of antimony as reported to the *Iron Age* from 1892 to 1899, inclusive:

Prices of antimony at New York since 1892, by months.

[Cents per pound.]

Month.	1892.			1898.		
	Cookson's.	L. X.	Hallett's.	Cookson's.	L. X.	Hallett's.
January	15½ to 16	12 to 15	12½ to 12½	11	10½	10½
February	15 to 15½	12 to 14	11½	10½	10½	9½ to 10
March	14½ to 15	11½ to 13	10½ to 11½	10½	10 to 12	10
April	14½ to 15½	12½ to 12½	10½ to 11	10½	10½	10
May	15	12½	11½	10½	10½	10
June	14½	12½	11½	10½	10½	9½
July	13½	12½	10½	10½	10½	9½
August	12	11½	10½	10½	10	9½
September	11½ to 11½	11 to 11½	10 to 10½	10½	10	9½
October	12	11½	10½ to 10½	10½	10	9½
November	11½	11	10½	10	9½	9½
December	11½	11	10½ to 10½	10½ to 10½	9½ to 9½	9½ to 9½

Month.	1894.			1895.		
	Cookson's.	Hallett's.	L. X.	Cookson's.	Hallett's.	Japanese.
January	10½	9½	9½	8½ to 8½	7½ to 7½	-----
February	10	9½	8½	8½ to 8½	7½ to 7½	-----
March	10½	9½	8½	8½	7½ to 7½	-----
April	10½	9½	8½	7½ to 8½	7 to 7½	6½ to 7
May	10½	9½	8½	7½ to 8	7	6½
June	9½	9½	8½	7½ to 8	7 to 7½	6½
July	10	8½	8½	8 to 8½	7½ to 7½	7
August	10	8½	8½	8	7½	7
September	9½	8½	7½	8	7½	6½ to 7
October	9½	8½	7½	7½ to 8	7 to 7½	6½
November	8½	8½	7½	7½ to 7½	7	6½ to 6½
December	8½	8½	7½	7½ to 7½	6½ to 7	6½ to 6½

Prices of antimony at New York since 1892, by months—Continued.

[Cents per pound.]

Month.	1896.			1897.		
	Cookson's.	Hallett's.	Japanese.	Cookson's.	Hallett's.	Japanese.
January	8½	7½ to 7½	7	7½ to 7½	6½ to 6½	6½ to 6½
February	8½	7½	7	7½ to 7½	6½ to 6½	6½ to 6½
March	8½	7½	7	7½ to 7½	6½ to 7½	6½ to 7
April	8½	7½	7	7½ to 7½	7 to 7½	7 to 7½
May	8 to 8½	7½ to 7½	6½ to 7	7½ to 7½	7 to 7½	6½ to 7½
June	8	7½	6½ to 7	7½ to 7½	6½ to 7	6½ to 6½
July	8	7½	6½ to 7	7 to 7½	6½ to 7½	6½
August	8	7½	6½ to 7	7 to 8½	7½ to 7½	6½ to 7
September ..	8	7½	6½ to 7	8 to 8½	7½ to 7½	7 to 7½
October	7½ to 7½	6½	6½	8 to 8½	7½ to 7½	7 to 7½
November ..	7½ to 7½	6½ to 6½	6½ to 6½	8 to 8½	7½ to 7½	7 to 7½
December ..	7½ to 7½	6½	6½	8 to 8½	7½ to 7½	7 to 7½

Month.	1898.			1899.		
	Cookson's.	Hallett's.	Japanese.	Cookson's.	Hallett's.	United States.
January	8 to 8½	7½ to 7½	7½ to 7½	10 to 10½	9½ to 9½	9½
February	8 to 8½	7½ to 7½	.....	10½ to 10½	9½ to 10½	9½ to 9½
March	8 to 8½	7½ to 7½	.....	11½ to 12	10½ to 10½	10½ to 10½
April	8½ to 9	7½ to 8	.....	11½ to 12	10½ to 10½	10½ to 10½
May	9½ to 9½	8½ to 8½	8½	11½ to 12	10½ to 10½	10½ to 10½
June	9½ to 9½	8½ to 9	8½ to 9	11½	10½	10½
July	9½ to 9½	9	9	11½	10½	10½
August	9½ to 9½	9	9	11½	10½	10½ to 11
September ..	9½ to 9½	9	9	11½	10½	10½ to 11
October	9½ to 9½	9	9	11½	10½	10½
November ..	9½ to 9½	9	8½ to 9	11½ to 11½	10½ to 10½	10 to 10½
December ..	9½ to 9½	8½ to 9	8½ to 8½	11½ to 11½	10½ to 10½	10 to 10½

USES.

Antimony is chiefly valuable as an alloy with other metals. It is used to large extent with lead in the manufacture of type metal, to which it gives hardness, and, what is more valuable, it possesses the peculiarity, when used as an alloy, of expanding at the moment of solidifying, thus giving to the type a clean, sharp impression. From 10 to 16 parts of antimony in 100 are used in making britannia metal. Pewter contains about 7 per cent. It is also used in the manufacture

of babbitt metal, an antifriction alloy used in the journals of railroad locomotives and cars and other rapidly moving machinery. It has lately been used as alloy with aluminum, to which it gives hardness and elasticity. Its effects on some metals is very injurious, particularly copper, an almost inappreciable amount (one part in a thousand) destroying its good qualities. The well-known medicinal preparation, tartar emetic, is a tartrate of antimony and potassium. The trisulphide is also used to some extent in medical practice. The sulphide was used to considerable extent by the ancients as a pigment, and women of the East are said to use it at the present day for darkening their eyebrows.

TUNGSTEN, MOLYBDENUM, URANIUM, AND VANADIUM.

By JOSEPH HYDE PRATT.

TUNGSTEN.

There are but few minerals that are a source of tungsten, and of these wolframite is the commonest, while hübnerite and scheelite are more sparingly found. Wolframite is a dark-gray to grayish-black mineral with a submetallic to resinous luster. Its specific gravity is 7.2 to 7.5 and its hardness 5 to 5.5. The mineral crystallizes in the monoclinic system and is often found in terminated crystals. It is very brittle and has a perfect cleavage parallel to the pinacoid face, 010, and an uneven fracture. It is more commonly found massive, with a more or less granular structure. The chemical composition of wolframite is tungstate of iron and manganese (Fe,Mn) WO_4 . There is another name that is constantly being confused with wolframite, and that is wulfenite; the latter is a lead molybdate, PbMoO_4 , and is a yellow to red mineral. Wolframite fuses easily before the blowpipe to a globule having a crystalline surface, which is sometimes magnetic.

Hübnerite is very similar to the wolframite, but usually occurs in bladed forms with rarely terminated crystals and has a brownish-red to nearly black color. Its chemical composition differs from that of wolframite in that the iron has been largely replaced by manganese and it is essentially manganese tungstate, MnWO_4 . Before the blowpipe it is less fusible than wolframite and gives a strong manganese reaction with sodium carbonate or borax.

Scheelite is a very heavy white to yellowish-white mineral with an adamantine to vitreous luster. Its specific gravity is 5.6 to 6.1, and its hardness being 4.5 to 5, it is readily scratched by steel. It crystallizes in the tetragonal system, but is more commonly found massive. It is a calcium tungstate, CaWO_4 . Before the blowpipe, scheelite is difficultly fusible to a semitransparent glass. It is decomposed by hydrochloric or nitric acid, leaving a yellow powder soluble in ammonia.

Besides these, the following minerals, containing tungsten, are found in small quantities at a few localities: Cuprotungstite, a tungstate of copper, CuWO_4 , which passes into a tungstate of copper and calcium, $(\text{Ca}, \text{Cu})\text{WO}_4$. It is a highly vitreous mineral of a pistachio-green color, and occurs in crusts. Stolzite, a lead tungstate, PbWO_4 , is sparingly found in tetragonal crystals, with acute octahedral habit, and of a green to brown or red color. Tungstite, tungsten trioxide, WO_3 , is a pulverulent and earthy mineral of a bright-yellow to yellowish-green color, which occasionally occurs with wolframite at various localities. Meymacite is a hydrated tungsten oxide formed from the alteration of scheelite.

Wolframite is usually found in metallic veins carrying the sulphides pyrite, galena, sphalerite, etc.; it is also often associated with tin ores. It frequently accompanies scheelite in the crystalline rocks and is embedded in quartz. It is widely distributed in nature, but it is only to be found in large quantities at a few localities. The occurrences of hübnerite are very similar to those just mentioned. Scheelite, on the other hand, is more commonly found associated with the crystalline rocks and embedded in quartz. It is in occurrences of this type that it is found in large quantities. In the metallic veins it is found in but very small quantity as an associate of wolframite and hübnerite.

OCCURRENCE.

Although tungsten minerals have been known for a long time, and the value of tungsten for making alloys has also been known, it is only within the past few years that there has been any considerable demand for this metal. Inquiries that have been made for tungsten minerals, and advertisements that have appeared asking for information regarding localities where these minerals could be found, have stimulated prospecting for them, which has met with more or less success. By far the greater number of localities of these minerals have been discovered in the Western States, the principal ones being Arizona, Nevada, and Colorado.

The source of tungsten ores for a number of years has been England, Austria-Hungary, Saxony, Germany, and Australia, and practically all the tungsten used in the United States was imported. With these recent discoveries of tungsten minerals in this country it is more than probable that instead of importing tungsten ores the United States will soon be in a position to export them.

Arizona.—In the Arivaca district in Pima County wolframite has been found in considerable quantity, and it is estimated that there are 4,000 pounds of ore on the dumps and as much more blocked out in the mine. A concentrating plant is being erected to treat these ores.

In the Dragoon Mountains, 13 miles from Benson and 6 miles north of Dragoon, Cochise County, quartz veins have been discovered traversing a coarse-grained granite. At intervals in the quartz there occur

bunches of hübnerite. Little work has thus far been done to determine what quantity of tungsten ore can be obtained from this deposit.

Nevada.—In the early part of 1900 a vein was discovered about 12 miles south of Osceola, White Pine County, Nevada, which carried wolframite, as described by Mr. F. B. Weeks in another paper.

The mine is 100 miles from Frisco, Utah, on the Oregon Short Line Railway, which is the nearest railroad point.

Colorado.—At a number of the gold and silver mines of San Juan County¹ hübnerite has been found in gold quartz veins. These veins, which may be from 4 to 8 feet wide, contain streaks from 4 to 24 inches wide that carry hübnerite, and these are usually nearest to one wall or the other. Although no large ore bodies of this mineral have yet been found, it has been observed in sufficient quantity to make it a valuable by-product. At a number of the unexplored veins it is very possible that wolframite could be cheaply and profitably mined. Scheelite has also been found occasionally associated with the hübnerite.

At Red Mountain, Ouray County, and in many of the mines in the vicinity of Leadville, Lake County, wolframite and hübnerite have been found. Some of the localities give evidence of containing a considerable quantity of these minerals.

Idaho.—Wolframite has been reported in the auriferous quartz veins near Murray, Shoshone County.

Oregon.—In the Virtue district, a few miles east of Baker City, Baker County, massive scheelite has been found. Little information, however, has thus far been obtained regarding the extent of the deposit or the nature of the occurrence.

South Dakota.—At the Harrison and Durango mines near Lead City, in the north Lead district, wolframite has been found in some quantity. At Sunday Gulch, near Oreville, Pennington County, wolframite has been found in such quantity that a number of tons have already been shipped.

Wolframite has been mined in the vicinity of Steins Pass, on the line of the Southern Pacific Railroad, near the New Mexico-Arizona line. Deposits of tungsten minerals have also been found at Neihart, Montana, and in Washington, but no definite information has as yet been obtained regarding the character of the ore or the localities. Scheelite has been found in a gold mine on Howard Hill, in Grass Valley, Nevada County, California, and is reported to be in considerable abundance.

Connecticut.—The American Tungsten Milling and Mining Company have recently begun the mining of scheelite on a large scale near Long Hill, Fairfield County. The deposit of scheelite is situated on South Hill, about half a mile from Long Hill Station on the Bridgeport division of the Berkshire Railroad, in Trumbull Township, about 9 miles north of the city of Bridgeport. The country is formed of rolling hills, South Hill attaining a height of about 250 feet above the valley.²

¹ Eng. and Min. Journal, Apr. 29, 1899.

² Am. Inst. Min. Eng., Vol. XXII, 1894, p. 236.

This occurrence of scheelite has been known for more than fifty years, having been first described by E. U. Shepard in a report of the Geological Survey of Connecticut in 1837.¹ During its early history mining was carried on for bismuth, lead, silver, and copper. The scheelite occurs in a vein of quartz—that is, in what might be called a blanket formation, dipping at a considerable angle toward the east. This vein lies between an amphibole-gneiss of a dark-black color and a bed of crystalline limestone that is 35 to 45 feet thick. The hanging wall, which is of limestone, is well defined, while the foot wall of amphibole-gneiss is at times rather obscure, owing to the fact that the crystals and particles of scheelite and quartz are found embedded in the country rock.

The vein consists of a compact mass of vitreous and translucent quartz containing cavities studded with quartz crystals, which are frequently covered with a thin film of yellow tungstite (wolfram-ocher). The quartz penetrates into the limestone, but more especially into the gneiss, so that sometimes these rocks become part of the ore bed. As associated minerals in the quartz vein are found pyrite, epidote, garnet, pyroxene, amphibole, and wolframite. The latter mineral occurs embedded not only in the quartz but also in the gneiss, often in well-shaped crystals which are pseudomorph after the scheelite. Sometimes the crystals of scheelite are only partially converted into wolframite, and both minerals are observed in the same specimen. This vein of quartz is traceable almost continuously along the outcrop of the limestone and gneiss. The distribution of the tungsten minerals through the vein is irregular, there being some portions much richer than others. The percentage of scheelite in the vein is approximately 5 per cent, which is the average run of the vein as determined from actual mill tests.

This area appears to be one of contact metamorphism, which has been subjected later to folding and regional metamorphism. I am inclined to believe that the scheelite is a mineral of pegmatites, and was introduced at a later time than during the metamorphic action to which these rocks were subjected.

The location is well adapted for mining, and by running a drift into the hill from the valley to and along the vein it will act as a drain for all the works, and then by making an inclined shaft from the drift to the surface the vein can be readily opened along its natural dip. This, however, should not be done until sufficient work has demonstrated that the ore occurs in quantity.

A very complete plant for separating and concentrating the scheelite has been erected by the company and treats the ore very satisfactorily. In the separation of the tungsten minerals the Hooper pneumatic system is used, and six Hooper pneumatic concentrators. Briefly, the ore is handled as follows: When taken from the mine it is hand-cobbed

¹ Geol. Survey Connecticut, New Haven, 1837.

and then hauled to the mill, a distance of about a quarter of a mile down grade, where it is dumped into a bin at the top of the mill, from which it is fed to a large crusher having a capacity of 150 tons per day. From this crusher it is conveyed to smaller ones, which reduce the ore to a size which enables it to be treated by the rolls. From these it is taken by an elevator belt to the finishing rolls, and from this it goes to the screens of three or more different mesh, and then to the hoppers, from which it is fed to the different Hooper concentrators, according to the size of the grains of ore. The ore that is too coarse to go through these sieves is reconveyed by an elevator belt to the finishing rolls, which reduce it to the desired size. By varying the speed, the inclination of the table, and the stroke of the concentrator, and by regulating the feed, an almost perfect separation can be made. The discharge is so arranged that the concentrates go into one channel and the tailings into another; the middlings are conveyed back to the hopper and re-fed to the concentrator. This process gives a nearly pure concentrate, with the exception of the pyrite, most of which goes with the scheelite. Analyses of the concentrates of scheelite gave values of tungstic oxide (WO_3) varying from 67 to 70 per cent, and of wolframite, from 55 to 60 per cent. As sulphur would be detrimental to the ore, experiments are being made as to the best method to employ in removing it. If no mechanical method can be devised, the ore can be roasted, thus eliminating the sulphur; but the pyrite could probably be removed by the electro-magnet, and if the cost of same was not too much it could be advantageously employed, except when there is wolframite present, which would also be removed with the pyrite.

North Carolina.—Tungsten minerals have been known to occur in North Carolina for a good many years and have been found in connection with some of the gold ores. At the time these minerals were discovered they had no value except as mineralogical specimens, and so no special attention was called to the localities where they occurred. Scheelite has been found at the following mines in Cabarrus County: At the Flowe mine, where it occurs in yellowish crystals; at the Cosby mine, where yellowish crystalline masses of considerable size were found; and at the Cullen mine, where it has been observed in rounded granular patches of a grayish-yellow color. Wolframite has also been found associated with the scheelite at all these mines, but from what information can be obtained the scheelite predominates. No work has been done at these mines for the tungsten minerals, and it is not known whether or not they occur in quantity.

Nova Scotia.—At Northeast Margaree, Cape Breton, Nova Scotia,¹ a quartz vein was discovered in a ravine between and near the base of two mountains that attain an elevation of about 800 feet. The vein has been traced across the ravine and for over 200 feet up the mountain. A small amount of development work was done by driving

¹A. C. Ross, Eng. and Min. Jour., Sept. 23, 1899.

tunnels into the mountain, which shows the wolframite to occur abundantly in places in the vein while it is almost entirely absent in others. One block of quartz that was taken out contained upward of one-half ton of ore. To what extent this deposit may be a source of tungsten is not yet determined.¹

USES.

Metallic tungsten has been obtained in the form of a metallic powder of a bright-gray luster which is sufficiently hard to scratch glass. In this form the metal is not changed by moist or dry air and at red heat it burns in the air to the trioxide. In 1781 the Swedish chemist, Scheele, proved that the mineral called wolframite contained a new mineral acid, to which the name tungsten (wolfram) was finally given.

The mineral wolframite had been known for a long time by both the German and Cornish tin miners and was looked upon with disfavor by them. The German miners had found by experience that when any of this mineral was smelted with the tin ore it impeded the reduction of the tin and facilitated its scorification. The Cornish miners called it "mock lead," because its high specific gravity had led them to believe that it contained lead. Considerable quantities of this mineral had been thrown aside by the Cornish miners and were not utilized until long afterwards when the real nature and value were discovered, and then these old dumps of the Cornish mines were reworked for this valuable mineral.

The uses of tungsten are varied, and the principal ones are in the manufacture of the alloys,² ferro-tungsten and aluminum-tungsten. Until recent years about the only uses of tungsten were in the preparation of salts used to make colored cotton goods fast or washable and to make clothes used for theatrical and other purposes noninflammable. It was also used to a certain extent in the manufacture of stained and other papers.

The use of ferro-tungsten in the manufacture of steels³ is becoming an industry of considerable importance. The tungsten makes the steel exceedingly hard and tough, and steel so treated is believed by many to be superior to any other steel manufactured. Projectiles made out of tungsten steel have penetrated through 14 inches of the best armor plate. It is also beginning to be used in the manufacture of tool steel and spring steel. Tools made of tungsten steel can be driven much faster in cutting other metals, and the tungsten spring steel has more carrying power than that made out of ordinary steel. It is also being used in sounding plates and wires for pianos, to which it gives additional strength and quality.

¹ See also U. S. Geol. Survey, Mineral Resources, 1882, p. 431; 1883-84, p. 574; 1885, p. 366; and 1886, p. 218.

² See Sixteenth Ann. Rept. United States Geological Survey, Part III, p. 615.

³ Jour. of Iron and Steel Institute, No. 1, 1895.

There is a considerable difference of opinion among chemists and metallurgists as to the special qualities or properties that tungsten will give to steel, some of these men taking almost opposite views from the others. However true the views held by those who do not believe in the beneficial qualities of tungsten on steel, nevertheless steel manufacturers are using tungsten, and there is a growing demand for this metal to be made into ferro-tungsten which is to be used in the manufacture of tungsten steels.

Tungsten is used in the manufacture of aluminum-tungsten, known to the trade as "wolfram-aluminum," which has had an especial use for roll sheets and plates to be afterwards spun; it has also been largely used for military equipments.¹ It is stated that the alloys of aluminum and tungsten can be advantageously used with the addition of copper. As usually made, the aluminum is hardened with some copper.

TESTS FOR TUNGSTEN.

It may be of value to give here a method for testing minerals for the presence of tungsten, and the following, which is that described by Professor Penfield,² will be found to give satisfaction: If the mineral is decomposed by boiling with hydrochloric acid, an insoluble canary-yellow tungstic oxide, WO_3 , is obtained. If a little granulated tin is added to the solution and the boiling continued, a blue color is obtained, which finally changes to brown upon further boiling.

If the tungstate is insoluble or difficultly soluble in hydrochloric acid as the mineral wolframite, mix the fine powdered mineral with six times its volume of sodium carbonate; make this into a paste with water, and fuse. Pulverize the fusion and dissolve it in a test tube with a little water, the sodium tungstate formed during the fusion being soluble in water. Acidify the filtrate with hydrochloric acid, and upon boiling with tin the blue reduction test may be obtained.

MOLYBDENUM.

There has been considerable discussion during the past year or two as to the actual commercial value of molybdenum and the purposes for which it can be used. At the present time the market for the mineral molybdenite, which is the chief source of this metal, is very limited, the consumption being only about 50 tons per year, bringing from 10 to 15 cents per pound, and the reduction of the ore is confined to a few plants. They demand an ore which will carry, when concentrated, 50 per cent or over of molybdenum, and which must be free

¹ Am. Mfg., Aug. 30, 1900.

² Penfield's Determinative Mineralogy, p. 128.

from copper. The principal use of molybdenum is in the manufacture of certain chemical reagents, especially ammonium molybdate, which is used in the determination of phosphoric acid. It is also used in the preparation of "blue carmine" for the coloring of porcelain. Another more recent use is in the manufacture of the alloy, ferro-molybdenum, which is used in the preparation of a special steel. It is often supposed that molybdenum is used at times in place of tungsten in the manufacture of hard steels, but each have certain valuable properties that they give to steel, which the steel manufacturers are rapidly beginning to appreciate. It is not, then, unreasonable to expect that there will be an increased demand for this metal and a wider market, which will warrant persistent prospecting for the mineral carrying it.

The metal molybdenum was discovered in 1778. When obtained in the metallic state it is in the form of a gray powder having a specific gravity of 8.6. It scarcely aggregates even under the influence of a most powerful heat. It is not acted upon by the air at the ordinary temperature. Molybdenum occurs but sparingly in nature and for the most part in the mineral molybdenite, MoS_2 , and less abundantly in the mineral wulfenite, PbMoO_4 . It also has been found sparingly as a trioxide, MoO_3 , in the mineral molybdite, which occurs in orthorhombic crystals that are grouped together in tufts or radiations of a straw-yellow color and of a silky to adamantine luster. It also occurs as incrustations and is usually associated with molybdenite. Wulfenite occurs commonly in square, tabular, tetragonal crystals that are sometimes very thin, also granularly massive. It has a resinous to adamantine luster and ordinarily an orange-yellow to bright red color. It is usually found in veins with other ores of lead.

In testing for molybdenum, consideration must be made as to whether it occurs as a sulphide or in an oxidized condition. A good test¹ for the sulphide of molybdenum is to heat a fragment of the mineral on the flat surface of a piece of charcoal for a considerable time in the oxidizing flame, there being deposited at a short distance from the assay a coating of molybdic oxide, MoO_3 . This is pale yellow when hot and almost white when cold. This oxide is volatile in the oxidizing flame, but if touched for an instant with a moderately hot reducing flame it assumes a beautiful ultramarine-blue color. Nearer the assay the charcoal is covered with a very thin tarnished copper-colored coating of MoO_3 , which is best seen when cold and by reflected light.

When the molybdenum occurs in the oxidized state, it is best tested for by treating a very small amount of the powdered molybdate with a scrap of paper about as large as the head of a pin in a test tube with about five drops of concentrated sulphuric acid and an equal amount

¹ Penfield's Determinative Mineralogy, 1898, p. 85.

of water and heating until copious white fumes arise. Then on cooling, the liquid will assume a magnificent deep blue color which has resulted from the reduction brought about by the organic matter of the paper. If heated the blue color will disappear, but will appear again upon cooling.

The principal source of this metal is the mineral molybdenite, which usually occurs in foliated masses or in scales with a perfect basal cleavage and a metallic luster. When crystallized it is in short or tabular hexagonal prisms. It is very soft, 1 to 1.5 in scale of hardness, being readily scratched with the finger nail, and is of a pure lead-gray color. It is often mistaken for graphite (plumbago), which it sometimes very closely resembles, but can be distinguished from it by its color, which is of a more bluish gray; by its streak on paper, which is gray to bluish gray, while graphite is black, and by its behavior before the blowpipe, the molybdenite giving off sulphur dioxide, which can be readily detected by its odor, while there is no change when the graphite is heated.

Molybdenite generally occurs embedded in or disseminated through crystalline rocks, principally in granite, gneiss, syenite, and granular limestone, and it has been found sparingly in these rocks at many localities. It is found more abundantly in certain of the Western States, and it is in these that the greater amount of prospecting has been carried on. In Washington, near Skagit, and about 1,000 feet below the White Pass railroad tunnel, molybdenite is found in considerable quantity in a deposit 5 to 8 feet wide which has been uncovered for a distance of 800 feet. No determination of the percentage of molybdenite has been made. From the Castleman mine in the Mount Baker district, Whatcom County, occasional shipments of molybdenite ore have been made. In Okanogan County several deposits are reported, which are for the most part associated with copper; one in the vicinity of Lake Chelan is reported to be very rich.

A vein 5 feet wide and carrying 15 per cent of molybdenite has been found in the Santa Rita Mountain district, Pima County, Arizona. It has also been reported as being found in some quantity at the Leslie mine, near Mullan, Shoshone County, Idaho; near East Las Vegas, San Miguel County, New Mexico, and near Portage, Aitkin County, Minnesota. Molybdenite is also said to occur in considerable quantity in California, Colorado, and Montana.

In Canada the Geological Survey are encouraging prospectors to look for molybdenite, and in British Columbia there are a number of localities that have been found which are similar to those mentioned in Washington. At Rencontre, Fortune Bay, Newfoundland, a deposit of this mineral is being opened up.

URANIUM AND VANADIUM.

The demand for these metals has been constantly increasing for the past few years, and considerable prospecting has been done for minerals containing them. This prospecting has been stimulated by advertisements that have appeared in some of the engineering papers asking for localities from which these minerals could be obtained. They are used at the present time in but very small quantities, due to the limited amount obtained, and not to the lack of uses to which they can be put. As they are found in larger quantities they will be used more extensively, for the demand for them is considerably greater than the supply.

URANIUM.

The reduction of the uranium compounds as they occur in nature, so as to obtain this metal in a chemically pure condition, is attended with considerable difficulty. For this reason chemical compounds and alloys of uranium are produced to a much greater extent than the metal. Uranium was first recognized as an element in 1782 by the chemist Klaproth, and was named after the planet Uranus. It is a steel-gray nonmagnetic metal which is softer than steel, being readily scratched by a file.

USES.

Uranium is one of the metals that has been attracting the attention of steel manufacturers in regard to the beneficial results that a small percentage of it produces in steel. Experiments have shown that a certain amount of a ferro-uranium alloy added to a fluid steel increases its tensile strength and toughness to a remarkable degree. This manufacture of ferro-uranium will probably become one of if not the largest use for the uranium ores, not necessarily to the replacement of ferro-tungsten or other alloys, but to make a steel having certain specific and valuable properties that the other metals will not give to it. Alloys of tungsten, molybdenum, or uranium, with iron, when mixed with fluid steel, increase its toughness; but at the same time each gives to the steel certain valuable properties that the other does not. Thus at the present time there is a demand for all these metals in the manufacture of ferro alloys, to be used in the making of various steels.

Other uses of uranium compounds are in the manufacture of porcelain and glass. The two oxides U_2O_5 and U_3O_8 are greatly prized for producing a pure black glaze on porcelain. For the decoration of glass and china ware, a hydrated sodium uranate, known as uranium yellow, and a hydrated ammonium uranate are used, which give permanent colors. These two compounds are also used in the manufacture of a uranium glass, which possesses the property of absorbing

certain chemically active light rays, and has a green-yellow fluorescence and is sometimes employed for ornaments. Certain uranium salts are used to a considerable extent in photography.

OCCURRENCE.

There are many minerals containing uranium that are known at the present time, but they are for the most part found but sparingly and some of them are only known from one locality. The only ones that have been found in sufficient quantity to become a source of uranium are uraninite, gummite (an alteration product of uraninite), and carnotite.

Uraninite, or as it is more commonly known pitchblende, is a uranate of uranyl and lead with usually thorium (or zirconium) and sometimes with the metals of the lanthanum and yttrium groups. Certain varieties contain nitrogen, and several of the newly discovered and rare elements, as helium, radium, and polonium. This mineral is usually massive and botryoidal, with a conchoidal to uneven fracture, and is brittle. Crystals are rare, the octahedron being the common form. It has a hardness of 5.5 and a specific gravity of 9 to 9.7. In appearance it is often pitch-like, having a submetallic to greasy and dull luster, and a grayish, greenish-black to velvet-black color.

Uraninite, which is the name given to the crystallized variety, occurs as a constituent in many pegmatitic dikes and coarse granites, and is the variety that generally carries the rare earths and nitrogen. The massive variety, pitchblende, usually contains none or but a very small amount of the rare earths and nitrogen, and is more commonly found as an associate in metalliferous veins, with the sulphides of silver, lead, copper, nickel, iron, and zinc.

Uraninite suffers alteration quite readily going over into the hydrated mineral, gummite, which looks like gum, and whose exact composition is not known. Crystals of gummite are observed only as pseudomorphs after uraninite; and it is more often in rounded or flattened pieces, with a greasy luster and a reddish yellow to orange, hyacinth-red or reddish brown color, the brighter colors being the more prominent. It is only 2.5 to 3 in hardness and has a specific gravity of 3.9 to 4.2. As would be naturally expected, gummite is to be found at nearly all the uraninite localities, masses of this mineral often being observed with nuclei of uraninite in the center. It has not been found as a distinct mineral. A further alteration of the uraninite, through gummite, is to the mineral uranophane or uranotil, which is found in masses of a fine fibrous structure, with a vitreous luster and a honey-yellow, lemon, or straw-yellow color. It is a hydrous silicate of calcium and uranium and besides being found as an alteration product, it also occurs as a distinct mineral. It is not

uncommon to find the uranophane surrounding a mass of gummite, in the center of which is a nucleus of uraninite.

Analyses illustrating the chemical composition of uraninite and its alteration products, gummite and uranophane, are given in the following table:

Analyses of uraninite, gummite, and uranophane.

	Uraninite.				Gummite.	Uranophane.
	1. Glastonbury, Conn.	2. Branchville, Conn.	3. Black Hawk, Colo.	4. Flat Rock, N. C.	5. Flat Rock, N. C.	6. Flat Rock, N. C.
Specific gravity	9.62	9.73	8.07	9.49	4.84	3.83
UO ₂	59.93	72.25	58.51	46.56	.....	.....
UO ₃	23.03	13.27	25.26	44.11	75.20	64.36
ThO ₂ .....	.....	7.20	a 7.59	.....	.....	.....
CeO ₂ .....	.....	.....	.....	.....	.....	.....
La ₂ O ₃	11.10	.....	.22	3.04	.....	.....
Y ₂ O ₃ .....	.....	.....	.....	.....	.....	.....
PbO	3.08	4.35	.70	4.53	5.57	.....
CaO .....	.11	.18	.84	.23	2.05	7.49
N	2.41	undet.	.15	undet.	.....	.....
H ₂ O .....	.43	.68	1.96	undet.	10.54	13.32
Fe ₂ O ₃ .....	.29	.11	.....	.....	.....	.47
Insol .....	.89	.04	.....	.06	.....	.....
SiO ₂ .....	.16	.03	2.79	.13	4.63	13.47
X	b .06	c .10	d 2.03	e .25	f 1.73	.....
Total	101.49	98.21	99.95	98.91	99.72	99.11

a = ZrO₂. b = P₂O₅ and Fl. c = MnO. d = ZnO, FeO, MnO, P₂O₅, As₂O₃, CuFeS₂, and FeS₂. e = MgO and Alk. f = BaO, Mn₂O₃, Al₂O₃, and P₂O₅.

Analyses 1 to 4 are by Hillebrand,¹ 5 by Genth,² and 6 by H. von Foullon.³

At present the principal occurrences of uraninite are at the Wood, Black Hawk, and Kirk mines, near Central City, Gilpin County, Colorado. It is also found in Colorado in the La Sal Mountains, at the head of Paradox Valley, in Montrose County, and at Cat Gulch, near Turret, Shasta County, and on Dolores River at the mouth of Disappointment Creek, 80 miles west of Dolores, Montezuma County. About 80 tons of the uranium minerals mentioned have been mined during the past three years, most of which was the mineral uraninite (pitchblende) from the Wood mine. Nearly all of this ore was shipped to France. In South Dakota, at the Ross-Hannibal mine, in the Ruby Basin of the Black Hills, uraninite has been found, but not in suffi-

¹ Bull. U. S. Geol. Survey, No. 78; Am. Jour. Sci., Vol. XL, 1890, p. 384.

² Am. Chem. Jour., Vol. I, 1879, p. 89; Dana Min. 1892, p. 892.

³ Vh. G. Reichs 21, 1883; Dana Min. 1892, p. 699.

cient quantity to mine. In many of the pegmatitic dikes and metalliferous veins of Montana, California, and New Mexico (in the President mine, near Elizabethtown, Colfax County) uranium minerals have been sparingly observed.

In the eastern part of the United States uraninite occurs in many of the pegmatitic dikes. At many of the feldspar quarries in Connecticut it has been sparingly found, as at a quarry near Middletown; at Hale's quarry in South Glastonbury; at Branchville, where it often occurs in small octahedral crystals embedded in albite. At a number of the mica mines of Yancey and Mitchell counties, North Carolina, it has been obtained in crystals and in masses. The Flat Rock and Deake mines, near Spruce Pine, Mitchell County, have furnished the greatest amount, some pieces having been found that weighed over 3 pounds, but which were largely altered to gummite and uranophane. This region is the most promising locality in North Carolina for finding uraninite in large quantities. At the Thompson mine, which is near the Deake, a mass of uraninite and gummite weighing 2 pounds and 10 ounces was found. Uraninite has been observed at Marietta, South Carolina, and at the famous gadolinite locality in Llano County, Texas.

Another uranium mineral that is worthy of note in connection with the above is autunite, sometimes called uranite, a hydrous calcium uranium phosphate, $\text{CaO} \cdot 2\text{UO}_3 \cdot \text{P}_2\text{O}_5 \cdot 8\text{H}_2\text{O}$, which is practically always found with uraninite and other uranium minerals. It occurs in small scales or foliated aggregates with micaceous structure on the feldspar and mica, or with galena, sphalerite, argentite, chalcopyrite, and the minerals associated with the uraninite in the dike or vein. It has a pearly and adamantine luster and a lemon to sulphur-yellow color, and is one of the indications of the presence of other uranium minerals. It is sometimes called uranium mica, as is also the mineral torbernite. (See below.)

The other uranium mineral that has become of economic importance is carnotite,¹ which has been recently discovered in Montrose County, Colorado. It occurs as a yellow to reddish-yellow crystalline powder or in loosely cohering masses that are easily separated by the fingers and leave traces on whatever touches them. When tested, the mineral was found to contain not only uranium, but also a considerable percentage of the valuable metal vanadium. Analysis shows it to be composed mainly of a hydrous vanadate of uranium and potassium. The purer varieties contain about 52 per cent of uranic oxide (UO_3), about 18 per cent of vanadium pentoxide (V_2O_5), about 5.5 per cent of potash (K_2O), and only about 5 per cent of silica (SiO_2).

The following complete analyses of carnotite have been made by Dr. W. F. Hillebrand² on material from (I) the Yellow Boy Group mines,

¹ Mining and Scientific Press, August 25, 1900.

² Mining and Scientific Press, August 25, 1900, p. 221.

La Sal Creek Canyon, and (II) Rock Creek, near Paradox, both in Montrose County, Colorado:

Analyses of carnotite.

	La Sal Creek. (I)	Rock Creek. (II)
UO ₃	52.28	52.25
V ₂ O ₅	17.80	18.35
K ₂ O.....	5.32	6.73
Na ₂ O.....	.07	.09
Li ₂ O.....	Trace.	None.
CaO.....	1.85	2.85
BaO.....	3.21	.72
MgO.....	.17	.20
PbO.....		.25
CuO.....	None.	.20
Fe ₂ O ₃	3.36	1.77
Al ₂ O ₃		1.08 app.
TiO ₂	None.	.10
H ₂ O (105°).....	4.52	2.59
H ₂ O (350°).....	3.49	3.06
H ₂ O redness.....	.38	None.
CO ₂	None.	.33
SO ₃	None.	.12
P ₂ O ₅	Trace.	.33
As ₂ O ₃	Trace.	.25
MoO ₃.....		.23
CrO ₃	None.	Trace.
SiO ₂	5.05	5.18
Insoluble residue except SiO ₂		3.16
Al ₂ O ₃ , MoO ₃ , PbO.....	2.50	
Total.....	100.00	99.84

Another specimen of carnotite was partially analyzed and gave only 15.77 per cent of uranic oxide and 4.40 per cent of vanadium pentoxide, but 55.80 per cent of silica.

Dr. J. Ohly¹ reports the discovery of a locality in a different part of the State from which he obtained a specimen of what was supposed to be carnotite, but when tested showed the presence of vanadium, but not of uranium, being a nearly pure vanadate. This mineral is now being investigated.

The only district in which the carnotite has been found is in Montrose County, Colorado, near the head of Paradox Valley, and in the

¹ Mining and Scientific Press, Aug. 25, 1900, p. 221.

La Sal Mountains. The carnotite ore occurs in fissures, sometimes over 2 feet in thickness and in a blanket formation. As mined the ore carries from 8 to 10 per cent metallic uranium. Over a carload of the ore has been mined and shipped.

The uranium minerals are readily separated from accompanying minerals and gangue by mechanical processes. That which has been mined in Colorado has been treated by chemical processes and shipped in the form of oxides to New York and then to France and Germany. The value of uranium ores, as quoted in New York, is \$10 per unit of metallic uranium, with a higher value for a more concentrated product. Uranium oxide is quoted at \$4 per pound.

LIST OF MINERALS CONTAINING URANIUM.

In the following list the name and composition of the minerals containing uranium in sufficient amount to classify them as uranium minerals are given:

Uranothallite, a hydrous calcium uranium carbonate, $2\text{CaCO}_3 \cdot \text{U}(\text{CO}_3)_2 \cdot 10\text{H}_2\text{O}$, occurs very sparingly as an incrustation of a siskin-green color on uraninite.

Liebigite, a hydrous calcium uranium carbonate, formula perhaps $\text{CaCO}_3 \cdot (\text{UO}_2)\text{CO}_3 \cdot 20\text{H}_2\text{O}$, occurs rarely as an apple-green crystalline incrustation on uraninite.

Voglite, a hydrous carbonate of uranium, calcium, and copper, of an emerald-green to grass-green color, is sparingly found in aggregates of crystalline scales implanted on uraninite.

Schröckingerite and randite are two uranium calcium carbonates of uncertain composition.

Some of the varieties of thorite contain a considerable quantity of uranium as uranothorite, which carries over 9 per cent of uranium oxide, U_2O_5 , and is found in the Champlain iron district, New York, but whose exact locality is unknown.

A number of the niobium and tantalum minerals contain from 2 to 15 per cent uranium oxide. They are, in the order of their percentage of uranium: Blomstrandite, hatchettolite, samarskite, polycrase, euxenite, fergusonite, ythotantalite, annerödite, and hielmite.

Uranosphærite, a hydrous bismuth uranate, $(\text{BiO})_2 \cdot \text{U}_2\text{O}_7 \cdot 3\text{H}_2\text{O}$, occurs sparingly in half-globular aggregated concentric forms of an orange-yellow color.

Torbernite, a hydrous phosphate of uranium and copper, $\text{Cu}(\text{UO}_2)_2 \cdot \text{P}_2\text{O}_5 + 8\text{H}_2\text{O}$, occurs in foliated micaceous aggregates of an emerald to grass-green color, closely resembling autunite.

Zeunerite is a hydrous copper uranium phosphate, $\text{Cu}(\text{UO}_2)\text{As}_2\text{O}_5 + 8\text{H}_2\text{O}$, similar in appearance to torbernite.

Uranospinite is a hydrous calcium uranium arsenate, probably $\text{Ca}(\text{UO}_2)_2 \cdot \text{As}_2\text{O}_5 + 8\text{H}_2\text{O}$, and similar to autunite, but rare.

Uranocircite is a hydrous barium uranium phosphate, $\text{Ba}(\text{UO}_2)_2\text{P}_2\text{O}_8 + 8\text{H}_2\text{O}$, similar to autunite, but very rare.

Phosphuranylite, a hydrous uranium phosphate, $(\text{UO}_2)_2\text{P}_2\text{O}_8 + 6\text{H}_2\text{O}$, sometimes carrying lead, is found sparingly as a deep lemon-yellow incrustation on quartz and feldspar at some of the uraninite localities in North Carolina.

Trögerite, a hydrous uranium arsenate, $(\text{UO}_2)_2\text{As}_2\text{O}_8 + 12\text{H}_2\text{O}$, in thin lemon-yellow crystals, has been found very sparingly at the Bald Mountain mining district, Black Hills, South Dakota.

Fritzscheite, a mineral resembling autunite, but of a reddish color, which is attributed to manganese, is of doubtful composition, but shows reactions for uranium, vanadium, manganese, phosphorus, and water.

Walpurgite, a basic arsenate of bismuth and uranium, $\text{Bi}_{10}(\text{UO}_2)_2(\text{OH})_{24}(\text{AsO}_4)_4$, is very rare.

Johannite is a hydrous sulphate of uranium and copper, of a beautiful emerald-green color.

Uranopilite, a hydrous calcium uranium sulphate, perhaps $\text{CaU}_2\text{S}_2\text{O}_{31} \cdot 25\text{H}_2\text{O}$, has been found as a velvety incrustation of a yellow color on uraninite.

Uraconite or uranocher is an amorphous earthy mineral of a fine lemon-yellow color, whose composition is principally a hydrous uranium sulphate.

Medjидite, uranochalcite, zippeite and voglianite are uranium sulphates of uncertain composition, containing from 36 to 79 per cent of uranium oxides.

VANADIUM.

Since the discovery of this metal in the early part of the nineteenth century, by Del Rio, and its rediscovery and investigation by the Swedish chemist Sefstroem in 1830, it has been shown to be quite widely distributed in nature, but for the most part in very small quantities. The metal is obtained with difficulty in the form of a brilliant metallic powder of a silver-white color.

It is, however, the compounds of vanadium that are employed in the arts; and, as our knowledge of these increases, and more is known of the valuable properties which they possess, there is a growing demand for them. Its main use, in the form of vanadic acid (V_2O_5), is as a mordant in dyeing (aniline black). Other vanadium compounds are used to a limited extent in the coloring of glass. Its value in the preparation of alloys is just beginning to be appreciated. Experiments have shown that a very small percentage of vanadium in iron, copper, or aluminum increases their tensile strength and ductility. It is, however, in the manufacture of a ferro-vanadium, to be used in the making of a special steel, that this metal will probably find its greatest use as an alloy.

OCCURRENCE.

Up to the present time the supply of vanadium has come from France, where it is obtained from certain slags at Creusot. With the discovery, however, of the mineral carnotite and the pure vanadate mentioned above a new source of supply should be opened. As yet, however, no definite information is known regarding the amount of ore that can be obtained from these deposits.

The metal is widely distributed, having been found in certain clays, iron ores (especially magnetite), coals, and in trap and basaltic rocks, besides the numerous vanadium minerals. It is, however, usually in but minute quantities, although some magnetites have been found that contained sufficient vanadium to make them profitable working.

Another source of vanadium, and one that has attracted and is still attracting the interest of manufacturers and chemists, is its existence in the ash of certain coals. It was first discovered in a lignite coal found at San Rafael, in the province of Mendoza, Argentin Republic, by Dr. Juan J. J. Kyle.¹ In testing the coal as to its value as a combustible, Dr. Kyle found that it left but a small amount of ash, which was of greenish color. On analyzing the ash it was found to contain vanadium, and in some quantity. From the results of the analyses, it shows that 1 ton of the coal will produce over 14 pounds of pure ash containing $4\frac{1}{2}$ pounds of the vanadic acid (V_2O_5), of which $3\frac{1}{2}$ pounds may be extracted by simple treatment of the ash with an alkaline liquor, while the remainder can be extracted by a more elaborate chemical process. In Cordoba and San Louis, neighboring provinces of Mendoza, the vanadium minerals, vanadite, descloisite, and psittacinite, have been found at a number of localities.

Vanadium has also been found in an anthracite coal mined near Yauli, in Peru. With this discovery the probability of finding vanadium in coals in other parts of the world is increased, and it may be that a careful examination of the coals from the United States, especially of the Western States, will show the presence of this metal.²

In analyzing the peats of eastern North Carolina, Dr. Chas. Baskerville³ found minute quantities of vanadium to be present in some of them, up to 0.003 per cent of P_2O_5 .

In a recent investigation by Dr. W. F. Hillebrand⁴ on the distribution of vanadium, he shows that in the more basic igneous and metamorphic rocks there occurs up to 0.08 per cent or more of V_2O_5 , but that it is apparently absent in the highly siliceous rocks. The source of the vanadium in the rocks appears to be the heavy ferric-aluminous silicates, biotites, amphiboles, pyroxenes. Sometimes the vanadium

¹ Buenos Ayres Standard, Jan. 30, 1894, and U. S. Consular Reports, 1894.

² Eng. and Min. Journal, Aug. 15, 1894; Jan. 26, 1896; Feb. 24, 1900.

³ Jour. Am. Chem. Soc., Vol. XXI, 1899, p. 707.

⁴ Bull. U. S. Geol. Survey, No. 167, 1900, p. 49.

occurs in considerable amount in these minerals, when they are given distinctive names, as roscoelite,¹ the vanadium mica, and lavrovite,² a variety of the pyroxene diopside.

Besides the two minerals referred to under "uranium" as containing an available source of vanadium, there are a number of other minerals that also carry this, but they have not been found as yet in sufficient quantity to be a source of vanadium.³

OTHER VANADIUM MINERALS.

The principal vanadium minerals are given below:

Vanadinite is a mineral usually occurring in hexagonal prisms which generally have smooth faces, but are apt to be cavernous, and are brittle, breaking with an uneven fracture. Its hardness is 2.75 to 3, and its specific gravity 6.6 to 7.2. The color of vanadinite varies from ruby-red, reddish-brown, light brownish-yellow to straw-yellow, and it has a resinous luster. It is a lead vanadate, whose formula is $(\text{PbCl})\text{Pb}_4(\text{PO}_4)_6$, and is commonly found associated with other lead minerals, especially in the Western States, where it has been found in some quantity in the silver-mining regions of Arizona and New Mexico, in red and orange crystals; in the former State, at the Vulture and Phoenix mines, in Maricopa County; the Mammoth Gold mine, near Oracle, Pinal County, and in Yuma County. In New Mexico it has been found at Lake Valley, Sierra County; at the Mimbres mines, near Georgetown, Grant County, and at Los Cerillos. It has also been found in the Leadville district of Colorado. At Zimapán, in Mexico, vanadinite has been found in some quantity in yellowish, reddish-brown to red crystals, and it was from this locality that this mineral was first discovered.

Endlichite is a variety of vanadinite that contains a considerable percentage of arsenic in a ratio that is nearly $\text{P}:\text{As}=1:1$.

Descloizite has been found in small crystals, and also massive, with fibrous structure and mammillary surface of a cherry red and brownish-red to light or dark brown color and greasy luster. In hardness this mineral is 3.5, and has a specific gravity of 5.9 to 6.2. Chemically it is a hydrous lead-zinc vanadate, having the formula $(\text{PbZn})_3\text{V}_2\text{O}_8 \cdot (\text{PbZn})(\text{OH})_2$. This is usually the composition of the crystallized varieties. Another variety, containing copper (as high as 11 per cent), occurs in crusts and reniform masses. It is found in some abundance at Lake Valley, Sierra County, and near Georgetown, Grant County, in New Mexico; near Tombstone, Cochise County; in Yavapai County, and at the Mammoth Gold Mine, near Oracle, Pinal County, in Arizona.

¹ Analyses, Hillebrand. Bull. U. S. Geol. Survey, No. 167, 1900, p. 70.

² Dana Mineralogy, 1892, p. 356, and Kk. Min. Russl., Vol. VI, p. 206.

³ Mining Reporter, July 6, 1899, p. 16.

Eusynchite, brackebuschite, and aræoxene are minerals similar and the first perhaps identical with descloizite.

Pucherite is a bismuth vanadate of a reddish-brown color, usually occurring in small tabular crystals.

Psittacinite is a vanadate of lead and copper, which has been found in thin coatings of a siskin to olive green color in the Silver Star district of Montana.

Mottramite is a vanadium mineral found in some considerable quantity at Alderly Edge and Mottram St. Andrews, in Cheshire, England, and may be identical with psittacinite.

There are a number of vanadium minerals of uncertain composition that are probably vanadates. These are chileite, a vanadate of lead and copper; vanadiolite, a dark emerald-green calcium vanadate containing silica; wicklowite, a doubtful lead vanadate.

Volborthite is a hydrous vanadate of copper, barium, and calcium of an olive-green color occurring in small six-sided tables.

Roscoelite is a vanadium mica that has been observed in minute scales of a clove-brown to greenish-brown color at the gold mine at Granite Creek, near Coloma, Eldorado County, California. In the Magnolia district, Colorado, earthy incrustations of this mineral have been found on calaverite.

Ardennite is a vanadio-silicate of aluminum and manganese, also containing arsenic, which is found rarely in small prismatic crystals of a yellow to yellowish-brown color, having a hardness of 6 to 7.

In the pyroxene group of minerals a variety of diopside called lavrovite is colored green by vanadium.

Dechenite and calciovolborthite are two vanadates that have been found very sparingly, the former being a lead and the latter a hydrous copper-calcium vanadate.

SUMMARY.

It will be seen from the above that the occurrences of both uranium and vanadium are confined almost entirely to the Western States, but that in some of these it occurs in some quantity. As yet the vanadium minerals have not played a very important part in the production of this metal, but with the new discoveries of minerals and localities that have been recently made they will very probably be the source of this metal produced in the United States. The increasing demand for both these metals has made a new source of supply necessary, and it has to all appearances been realized in the deposits of the various minerals carrying these metals that have recently been found in Montana, Colorado, Utah, and California. There is an interesting field for research opened up for chemists in the investigation of the coals for vanadium, especially those found in Colorado and Montana.

TESTS FOR URANIUM AND VANADIUM.

The following tests can be used to advantage in detecting uranium and vanadium in minerals:

*Uranium.*¹—Make a small salt of phosphorus (hydrogen sodium ammonium phosphate, $\text{HNaNH}_4\text{PO}_4 \cdot 4\text{H}_2\text{O}$) bead on platinum wire. To this add a little of the powdered mineral to be tested. The oxide of uranium is soluble, and before the blowpipe in the oxidizing flame it converts the colorless bead to a clear yellow, which become yellowish-green on cooling, while after heating in the reducing flame the bead assumes a fine green color. When there are other elements in the mineral that will impart color to the bead and for the detection of small quantities of uranium, it is best to proceed as follows: Dissolve the mineral in hydrochloric acid (after fusion with sodium carbonate, if necessary), nearly neutralize the excess of acid with ammonia, add solid ammonium carbonate, shake vigorously, and allow the liquid to stand a few minutes. The uranium is at first precipitated, but is soluble in excess of ammonium carbonate, and by filtering may be separated from a great many elements which are precipitated by that reagent. Sometimes there is difficulty in obtaining a clear filtrate, and, if so, a few drops of ammonium sulphide may be added with the ammonium carbonate. Boil the filtrate containing uranium to expel carbon dioxide, add ammonia in excess, collect the precipitate containing uranium on a filter and test it with a salt of phosphorus bead, as described above.

*Vanadium.*²—Test with a salt of phosphorus bead, as described under "Uranium." The color of the bead in the oxidizing flame is yellow to deep amber, fading slightly on cooling, while in the reducing flame it is an indistinct dirty green, which changes to a fine green on cooling.

If there is but a small amount of vanadium in the mineral or there are other oxides that will impart color to the bead, the powdered mineral should be fused with about four parts of sodium carbonate and two of potassium nitrate in a platinum or porcelain spoon. After cooling, the fusion should be digested with warm water, in order to dissolve out the soluble alkali vanadate. Filter, acidify the filtrate with a slight excess of acetic acid, and add a little lead acetate, which will precipitate a pale-yellow lead vanadate (lead chromate, which would be precipitated in the same process, is much yellower). The precipitate, after being collected on a filter paper, can be tested with the phosphorus bead.

¹ Penfield's Determinative Mineralogy, 1898, p. 129.

² Op. cit., p. 130.

AN OCCURRENCE OF TUNGSTEN ORE IN EASTERN NEVADA.

By F. B. WEEKS.

The existence of a hübnerite-bearing vein about 12 miles south of Osceola, Nevada, was discovered in the early part of 1900. It occurs in the foothills on the west slope of the Snake Mountains, and near the base of Wheeler Peak, which is the culminating point of the range. The region is about 100 miles from Frisco, Utah, on the Oregon Short Line Railway, which is the nearest railroad point. A hasty examination of this locality was made in the course of a reconnaissance trip through this region in August, 1900. Prior to that time a small amount of ore had been gathered from the débris of the surface below the outcrop of the vein, and had been shipped in ton lots. The mineral was also seen to be disseminated through the loose soil of the mountain slopes.

The Tungsten mining district was organized in April, 1900. At the time of this examination a small gasoline plant with crusher and jigging apparatus was being installed so that shipment by the carload is now possible.

The vein in which the hübnerite occurs cuts across the country rock, which is a rather coarse porphyritic granite of the usual quartz-mica-hornblende variety. This granite has a rudely bedded structure, parallel to that of the overlying Cambrian quartzite which dip 20° to 25° SSW. The strike of the vein is N. 68° E., and the dip is 65° NW. The main vein is normally about 3 feet in width. In places it pinches to a few inches in thickness, but resumes its usual width within 30 to 40 feet. Several smaller veins from a few inches to a foot in thickness were seen to outcrop on the slopes and could be traced to the main vein, with which they form a sharply acute angle. The main vein was traced for a distance of 2,100 feet by croppings and floats from its outcrop near the base of the lowest foothill up the slope of the mountain.

A sufficient development of the vein had not been made at the time of the examination to determine the extent of the ore deposition. A tunnel about 40 feet in length had been driven in at the lowest outcrop of the vein, and was the only opening that had been made. The walls of the vein are well defined. Where the vein has its average

thickness it is formed of a milky-white quartz and carries a large amount of the hübnerite. Where the vein is pinched the quartz is schistose and the ore is in thin stringers and of small amount. The ore occurs in solid masses, frequently attaining a thickness of 6 to 12 inches. It is disseminated through the vein material in thick, plate-like forms, and also occurs crystallized with the quartz crystals. Small shoots of ore were seen penetrating the country rock for a few inches. The vein material is readily crushed, and the mineral, on account of its weight, is easily separated by jigging.

Later information stated that the tunnel was extended to a length of 65 feet, the vein widened out to 4 feet, and that the mineral occurs in bunches across the full width of the vein. Scheelite has also been found in small bunches and streaks with the hübnerite.

On one locality on the vein there was a somewhat remarkable occurrence of the ore. It was found in large bunches or blocks averaging 75 per cent of tungstic acid, and from a small space $4\frac{1}{2}$ tons of the tungsten ore had been obtained. From report it was learned that other smaller quartz veins carrying wolframite had been found and located in the immediate vicinity. The veins are said to carry gold in very small amount.

COAL.

By EDWARD W. PARKER.

INTRODUCTION.

The present chapter, dealing primarily with the statistics of coal production in 1899, contains also a résumé of the production in previous years. The statistics are presented as uniformly as possible with the preceding reports of the series. They have been compiled, with a few exceptions, from direct returns to the Survey or its agents. In most of the cases where operators have failed to reply to the inquiries sent them from this office, the desired statements have been obtained from State officials, and in the few instances where, from unavoidable causes exact information could not be obtained, the shipments have been furnished by railroads, or the production has been carefully estimated upon the basis of tonnage reported in preceding years. Owing to the fact that many of the largest mines, particularly in western Pennsylvania, changed hands during the year, unusual difficulty and delay were experienced in securing the reports for the entire twelve months. This was not due to any unwillingness on the part of either the old or new owners to furnish the information, but to the fact that the books and records had been removed and were not available. The tracing up of these records is responsible largely for the slight delay in completing the report.

Acknowledgments.—The writer desires first of all to acknowledge the hearty cooperation of the coal operators in furnishing the statements of their production. Thanks are also due to Mr. R. M. Haseltine, chief inspector of mines of Ohio; Mr. David Ross, secretary of the Bureau of Labor Statistics of Illinois; Mr. Orson V. Smith, of the Bureau of Industrial Statistics of Pennsylvania; Messrs. H. F. Bain and S. W. Beyer, of the Iowa Geological Survey; Mr. Charles G. Yale, of the State Mining Bureau of California, and Mr. G. W. Stone, mine inspector of Kentucky, for assistance rendered in their respective States. The interesting report on the production of anthracite coal in Pennsylvania has been prepared as usual by Mr. William W. Ruley, of Philadelphia, chief of the Bureau of Anthracite Coal Statistics, and

special agent of the Geological Survey. The preparation of the statistical tables has been the special work of Mr. Theodore H. Johnson, one of the statistical experts of the Geological Survey, and acknowledgment is here made of his faithful and intelligent cooperation in this branch of the work.

Special features of the report.—In addition to the statistics of production in the United States, tables are presented showing the production in all the countries of the world for which records are available and covering a period of thirty-two years. The steady advance made by the United States from third to first place and from 14.35 to 32 per cent of the world's total is graphically shown in these tables.

Particular attention has been given in the preparation of this report to the collection of information regarding the increased use of machines for undercutting the coal in the bituminous mines of the United States. The inquiries have been extended to show the types of machines employed and to what extent air and electricity are used as motive power.

Reviews of the coal trade at the important centers and shipping ports have been contributed by secretaries of boards of trade, etc., or compiled from official sources, and they form an important and interesting feature of these reports. The names of the writers are given in connection with their contributions, and when reference is made to official reports or trade papers due credit is given the authority.

Unit of measurement.—Some confusion is apt to occur by the fact that both the long ton of 2,240 pounds and the short ton (2,000 pounds) are used in this chapter. This is unfortunate, but can not be avoided. Pennsylvania anthracite is always measured by the long ton. In cases where Pennsylvania bituminous coal is sold in the Eastern markets the long ton is used. The same is true of West Virginia and of the Tazewell and Wise County coals of Virginia. The laws of Maryland permit the use of the long ton only. In all other cases bituminous coal is sold by the short ton. For the sake of convenience the bituminous product has in this report been reduced to short tons, and when the anthracite and bituminous products are tabulated together the short ton is used. In the section devoted entirely to Pennsylvania anthracite the long ton only is used, and in the table of shipments from the Cumberland region this is also the case.

THE COAL FIELDS OF THE UNITED STATES.

For convenience the coal areas of the United States are divided into two great classes—the anthracite and the bituminous.

In a commercial sense, particularly in the East, when the anthracite fields are mentioned the fields of Pennsylvania are considered, though Colorado and New Mexico are now supplying anthracite coal of good

quality to the Rocky Mountain region, and small amounts are mined annually in Virginia. This small quantity from Virginia and a semi-anthracite product from Arkansas are considered with the bituminous output. In previous years some coal which was classed as anthracite has been mined and sold in New England. The productive area was confined to the eastern part of Rhode Island and the counties of Bristol and Plymouth, in Massachusetts. The classing of this product as anthracite coal was erroneous. The original beds have been metamorphosed into graphite or graphitic coal, and the product requires such a high degree of heat for combustion that it can be used only with other combustible material or under a heavy draft. It is, therefore, not an economical practice to use this product for fuel in competition with the anthracite coal from Pennsylvania or the bituminous coals from the New River and Pocahontas fields, which are now sent in large quantities to New England points, and its mining for fuel purposes has been abandoned.

The bituminous division includes the following coal fields: (1) The Triassic field, embracing the coal beds of the Triassic or new red sandstone formation in the Richmond basin in Virginia and in the coal basins along the Deep and Dan rivers in North Carolina; (2) the Appalachian field, which extends from the State of New York on the north to the State of Alabama on the south, having a length northeast and southwest of over 900 miles, and a width ranging from 30 to 180 miles; (3) the northern field, which is confined exclusively to the central part of Michigan; (4) the central field, embracing the coal areas in Indiana, Illinois, and western Kentucky; (5) the western field, including the coal areas west of the Mississippi River, south of the forty-third parallel of north latitude, and east of the Rocky Mountains; (6) the Rocky Mountain field, containing the coal areas in the States and Territories lying along the Rocky Mountains; (7) the Pacific coast field, embracing the coal districts of Washington, Oregon, and California.

The various fields are described at some length in Mineral Resources for 1886, and also in the report for 1894. The latter also contains some historical information regarding the development of these fields. Mineral Resources for 1892 contains some interesting contributions from State geologists on the coal fields of several States.

The following table contains the approximate areas of the coal fields in the various States, grouped according to the divisions mentioned, with the total output from each from 1887 to 1899:

Classification of the coal fields of the United States.

	Area.	Product in—		
		1887.	1888.	1889.
<i>Anthracite.</i>	<i>Sq. miles.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
New England (Rhode Island and Massachusetts)	500	6,000	4,000	2,000
Pennsylvania	480	39,506,255	43,922,897	45,544,970
Colorado and New Mexico	15	36,000	44,791	53,517
	995	39,548,255	43,971,688	45,600,487
<i>Bituminous. (a)</i>				
Triassic:				
Virginia	180	30,000	33,000	49,411
North Carolina	2,700			222
Appalachian:				
Pennsylvania	9,000	31,516,856	30,796,727	36,174,089
Ohio	10,000	10,301,708	10,910,951	9,976,787
Maryland	550	3,278,023	3,479,470	2,939,715
Virginia	2,000	795,263	1,040,000	816,375
West Virginia	16,000	4,881,620	5,498,800	6,231,880
Kentucky	11,180	950,903	1,193,000	1,108,770
Tennessee	5,100	1,900,000	1,967,297	1,925,689
Georgia	200	313,715	180,000	225,934
Alabama	8,660	1,950,000	2,900,000	3,572,983
	62,690	55,888,088	60,966,245	62,972,222
Northern:				
Michigan	6,700	71,461	81,407	67,431
Central:				
Indiana	6,450	3,217,711	3,140,979	2,845,057
Kentucky	4,500	962,282	1,377,000	1,290,965
Illinois	36,800	10,278,890	14,655,188	12,104,272
	47,750	14,478,883	19,173,167	16,240,314

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Area.	Product in—		
		1887.	1888.	1889.
<i>Bituminous (a)—Continued.</i>				
Western:	<i>Sq. miles.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Iowa	18,000	4,473,828	4,952,440	4,045,358
Missouri	26,700	3,209,916	3,909,967	2,557,823
Nebraska	3,200	1,500	1,500	2,222,543
Kansas	17,000	1,596,879	1,850,000	
Arkansas	9,100	129,600	276,871	279,584
Indian Territory	20,000	685,911	761,986	752,832
Texas	4,500	75,000	90,000	128,216
	98,500	10,172,634	11,842,764	10,036,356
Rocky Mountain, etc.:				
Dakota		21,470	34,000	28,907
Montana		10,202	41,467	363,301
Idaho		500	400	
Wyoming		1,170,318	1,481,540	1,388,947
Utah		180,021	258,961	236,651
Colorado	2,913	1,755,735	2,140,686	2,544,144
New Mexico		508,034	626,665	486,463
		3,646,280	4,583,719	5,048,413
Pacific coast:				
Washington		772,612	1,215,750	1,030,578
Oregon		31,696	75,000	64,359
California		50,000	95,000	119,820
		854,308	1,385,750	1,214,757
Total product sold.....		124,689,909	142,037,740	
Colliery consumption		5,960,302	6,621,667	
Total product, including colliery consumption		130,650,211	148,659,407	141,229,613

a Including lignite, brown coal, and scattering lots of anthracite.

MINERAL RESOURCES.

Classification of the coal fields of the United States—Continued.

	Product in—				
	1890.	1891.	1892.	1893.	1894.
<i>Anthracite.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
New England (Rhode Island and Massachusetts)		500			
Pennsylvania	46,468,641	50,665,431	52,472,504	53,967,543	51,921,121
Colorado and New Mexico	(a)	(a)	64,968	98,578	71,550
	46,468,641	50,665,931	52,537,467	54,061,121	51,992,671
<i>Bituminous. (b)</i>					
Triassic:					
Virginia	19,346	17,290	37,219	19,878	52,079
North Carolina	10,262	20,355	6,679	17,000	16,900
Appalachian:					
Pennsylvania	42,302,173	42,788,490	46,694,576	44,070,724	39,912,463
Ohio	11,494,506	12,868,683	13,562,927	13,253,646	11,909,856
Maryland	3,357,813	3,820,239	3,419,962	3,716,041	3,501,428
Virginia	764,665	719,109	637,986	800,461	1,177,004
West Virginia	7,394,494	9,220,665	9,738,755	10,708,578	11,627,757
Kentucky	1,206,120	1,222,918	1,231,110	1,245,785	1,218,072
Tennessee	2,169,585	2,413,678	2,092,064	1,902,258	2,180,879
Georgia	228,337	171,000	215,498	372,740	354,111
Alabama	4,090,409	4,759,781	5,529,812	5,136,935	4,397,178
	73,008,102	77,984,563	83,122,190	81,207,168	76,278,748
Northern:					
Michigan	74,977	80,307	77,990	45,979	70,002
Central:					
Indiana	3,305,787	2,973,474	3,345,174	3,791,851	3,423,921
Kentucky	1,495,376	1,693,151	1,794,208	1,761,394	1,893,120
Illinois	15,274,727	15,660,698	17,862,276	19,949,564	17,113,576
	20,075,840	20,327,323	23,001,653	25,502,809	22,430,617

a Included in bituminous product.

b Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—				
	1890.	1891.	1892.	1893.	1894.
Bituminous (a)—Continued.					
Western:	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Iowa	4,021,739	3,825,495	3,918,491	3,972,229	3,967,253
Missouri	2,735,221	2,674,606	2,733,949	2,897,442	2,245,039
Nebraska	2,259,922	1,500	1,500		
Kansas		2,716,705	3,007,276	2,652,546	3,388,251
Arkansas	399,888	542,379	535,558	574,763	512,626
Indian Territory	869,229	1,091,032	1,192,721	1,252,110	969,606
Texas	184,440	172,100	245,690	302,206	420,848
	10,470,439	11,023,817	11,635,185	11,651,296	11,503,623
Rocky Mountain, etc.:					
Dakota	30,000	30,000	40,725	49,630	42,015
Montana	517,477	541,861	564,648	892,309	927,395
Wyoming	1,870,366	2,327,841	2,503,839	2,439,311	2,417,463
Utah	818,159	371,045	361,013	413,205	431,550
Colorado	3,094,003	3,512,682	3,447,967	4,018,793	2,776,817
New Mexico	375,777	462,328	659,230	655,112	580,238
Nevada					150
	6,205,782	7,245,707	7,577,422	8,468,360	7,175,628
Pacific coast:					
Washington	1,263,689	1,056,249	1,213,427	1,264,877	1,106,470
Oregon	61,514	51,826	34,661	41,683	47,521
California	110,711	93,301	85,178	72,603	67,247
	1,435,914	1,201,376	1,333,266	1,379,163	1,221,238
Total product, including colliery consumption....	157,770,963	168,566,669	179,329,071	182,352,774	170,741,526

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—				
	1895.	1896.	1897.	1898.	1899.
<i>Anthracite.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
New England (Rhode Island and Massachusetts)					
Pennsylvania	57,999,337	54,346,081	52,611,690	53,382,644	60,418,005
Colorado and New Mexico	67,179	79,492	69,076	47,095	96,196
	58,066,516	54,425,573	52,680,756	53,429,739	60,514,201
<i>Bituminous. (a)</i>					
Triassic:					
Virginia	57,782	95,670	95,670	38,938	28,353
North Carolina	24,900	7,813	21,280		
Appalachian:					
Pennsylvania	50,217,228	49,557,453	54,417,974	65,165,133	74,150,175
Ohio	13,355,806	12,875,202	12,196,942	14,516,867	16,500,270
Maryland	3,915,585	4,143,936	4,442,128	4,674,884	4,807,396
Virginia	1,310,542	1,159,053	1,432,632	1,787,831	2,104,334
West Virginia	11,387,961	12,876,296	14,248,159	16,700,999	19,252,995
East Kentucky	1,490,057	1,486,016	1,411,897	1,591,076	1,871,550
Tennessee	2,535,644	2,663,106	2,888,849	3,022,896	3,330,659
Georgia	260,998	238,546	195,869	244,187	233,111
Alabama	5,693,775	5,748,697	5,893,770	6,535,283	7,593,416
	90,167,596	90,748,305	97,128,220	114,239,156	129,872,259
Northern:					
Michigan	112,322	92,882	223,592	315,722	624,708
Central:					
Indiana	3,995,892	3,905,779	4,151,169	4,920,743	6,006,523
West Kentucky	1,867,713	1,847,462	2,190,200	2,296,832	2,735,705
Illinois	17,735,864	19,786,626	20,072,758	18,599,299	24,439,019
	23,599,469	25,539,867	26,414,127	25,816,874	33,181,247

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—				
	1885.	1886.	1887.	1888.	1899.
Bituminous (a)—Continued.					
Western:	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Iowa	4,156,074	3,954,028	4,611,865	4,618,842	5,177,479
Missouri	2,372,393	2,331,542	2,665,626	2,688,321	3,025,814
Nebraska and Idaho		b 3,560	645	c 1,039	c 20
Kansas	2,926,870	2,894,801	3,054,012	3,406,555	3,852,267
Arkansas	598,322	675,374	856,190	1,205,479	843,554
Indian Territory	1,211,185	1,366,646	1,336,380	1,381,466	1,537,427
Texas	484,959	544,015	639,341	686,731	883,832
	11,749,803	11,759,966	13,164,059	13,988,436	15,320,393
Rocky Mountain, etc.:					
North Dakota	39,197	d 78,050	77,246	83,895	98,809
Montana	1,504,193	1,543,445	1,647,882	1,479,803	1,496,451
Wyoming	2,246,911	2,229,624	2,597,886	2,863,812	3,837,392
Utah	471,836	418,627	521,560	593,709	786,049
Colorado	3,027,327	3,054,711	3,307,644	4,053,210	4,718,590
New Mexico	709,130	600,823	701,964	968,330	1,012,152
Nevada					
	7,998,594	7,925,280	8,854,182	10,042,759	11,949,443
Pacific coast:					
Washington	1,191,410	1,195,504	1,434,112	1,884,571	2,029,881
Oregon	73,685	101,721	101,755	58,184	86,888
California	75,453	e 93,776	e 103,912	e 160,288	e 160,972
	1,340,548	1,391,001	1,639,779	2,103,043	2,277,741
Total product, including colliery consumption....	193,117,530	191,986,357	200,221,665	219,974,667	253,739,992

a Including lignite, brown coal, and scattering lots of anthracite.

b Nebraska only.

c Idaho only.

d Includes South Dakota.

e Includes Alaska.

RELATIVE IMPORTANCE OF VARIOUS FIELDS.

It will be seen from the foregoing table that the output of anthracite coal, including the product of Colorado and New Mexico, has increased from 39,548,255 short tons in 1887 to 60,514,201 short tons in 1899, or a little more than 50 per cent. In the ten years from 1889 to 1899 the product of anthracite coal increased about one-third. The product of anthracite coal in 1899 exceeded by nearly two and a half million tons the phenomenal yield of 1895.

In point of area the Western is the most extensive of the bituminous fields, having an area of nearly 100,000 square miles. In point of production, however, the fields of the Appalachian system are by far the most important, the yield from these fields, with an area about two-thirds of that of the Western, being over two-thirds of the total

bituminous product of the United States. In 1899 the coal product of the Appalachian system was 129,872,259 short tons, an increase of 74,679,225 short tons, or 135.3 per cent, over 1887, and of 15,633,103 short tons, or 13.7 per cent, over 1898. Next in importance is the Central field, having an area of 47,750 square miles, and a production in 1899 of 33,181,247 short tons, about one-fourth of that of the Appalachian, and 17.2 per cent of the total bituminous product. The Western field is third in producing importance, although first in size. Its product in 1899 was 15,320,393 short tons, about one-eighth of that of the Appalachian field and 8 per cent of the total. The areas of the coal fields in the Rocky Mountain and Pacific coast fields have not been determined. The former, fourth in producing importance, has increased its output from 3,646,280 short tons in 1887 to 11,949,443 short tons in 1899. The Pacific coast fields produced in 1899 2,277,741 short tons, 90 per cent of which was from the State of Washington. The production of these five fields in 1887, 1898, and 1899, with the increases in 1899 as compared with the other two years, is shown in the following table:

Production of the five principal bituminous coal fields in 1887, 1898, and 1899 compared.

Field.	1887.		1898.		1899.	
	Product.	Per cent of total.	Product.	Per cent of total.	Product.	Per cent of total.
	<i>Short tons.</i>		<i>Short tons.</i>		<i>Short tons.</i>	
Appalachian ..	55, 193, 034	63. 0	114, 239, 156	68. 6	129, 872, 259	67. 2
Central	14, 478, 883	16. 5	25, 816, 874	15. 5	33, 181, 247	17. 2
Western	10, 193, 034	11. 6	13, 988, 436	8. 4	15, 320, 393	8. 0
Rocky Mountain	3, 646, 280	4. 15	10, 042, 759	6. 0	11, 949, 443	6. 2
Pacific coast ..	854, 308	1. 0	2, 103, 043	1. 26	2, 277, 741	1. 18

Field.	Increase in 1899 over 1898.		Increase in 1899 over 1887.	
	Amount.	Per cent.	Amount.	Per cent.
	<i>Short tons.</i>		<i>Short tons.</i>	
Appalachian	15, 633, 103	13. 7	74, 679, 225	135. 3
Central	7, 364, 373	28. 5	18, 702, 364	129. 2
Western	1, 331, 957	9. 5	5, 127, 359	50. 3
Rocky Mountain	1, 906, 684	19. 0	8, 303, 163	227. 7
Pacific coast	174, 698	8. 3	1, 423, 433	166. 6

PRODUCTION.

The total product of anthracite coal in Pennsylvania in 1899 was 53,944,647 long tons, equivalent to 60,418,005 short tons, valued at the mines at \$88,142,130.

The total product of bituminous coal in 1899 (including lignite or brown coal, cannel, splint, and block coals, and the small anthracite product of Colorado and New Mexico) was 172,608,917 long tons, or 193,321,987 short tons, valued at the mines at \$167,935,304.

The aggregate product of anthracite and bituminous coal in 1899 was 226,553,564 long tons, or 253,739,992 short tons, valued at \$256,077,434.

The record made in 1899 is an important one. Not only did the production exceed all previous records, but it placed the United States at the head of the coal-producing countries of the world. The production in each of the last three years has been the largest up to that time. In 1897 the output reached for the first time a total of 200,000,000 short tons. The product in 1898 was 219,974,667 short tons, an increase of nearly 10 per cent over 1897. The statistics for 1899 show an increase of 33,765,325 short tons, or 15.35 per cent, over 1898, and of 53,518,327 short tons, or 26.73 per cent, over 1897. Comparing the product in 1899 with some of the earlier years of our history, a still more remarkable advance is shown. In 1889 our total production of coal was 141,229,613 short tons, showing an increase in ten years of 112,510,379 short tons, or nearly 80 per cent. In 1879 our production amounted to only 66,452,960 short tons, compared with which the output in 1899 shows an increase of about 280 per cent, while in thirty years the production has increased about 700 per cent, the yield in 1899 being eight times that of 1869, one generation ago. In the same period the production of Great Britain has about doubled, that of Germany has been multiplied by 4, and that of France by 2.5. In 1869 the coal product of Great Britain was nearly four times that of the United States, and that of Germany exceeded ours by about 20 per cent.

One of the interesting features of the history of coal production in the United States in the past three years is that the operators were prepared by the preceding years of depression to meet the demands made upon them by the period of prosperity through which the country has been passing. During the four or five years of "hard times" coal operators were contending with steadily declining prices, brought about by a continued overproduction and a keen competition for a market for the output. To meet these conditions, methods were adopted wherever possible for cheapening the cost of production by the installation of coal-cutting machines, mechanical haulage, etc., so that when the extraordinary demands of the past two years developed many operators were able to expand their production 25 or 50 per cent without materially increasing the lengths of their pay rolls.

Another feature worthy of note, which is shown in the statistics for 1899, is the advance in the average price per ton and a consequent increase in the value of the product proportionately greater than the increase in product. As shown in a subsequent table, this is the first time in a period of twelve years when there has been an advance in the general average price. The improvement in the price of coal, however, was not as marked as that shown in many other commodities. Much of the coal marketed in 1899 was sold on contracts made the preceding year, and it was not until the latter part of the year that the operators began to reap actual benefits from the improved conditions.

The statistics regarding the use of mining machines, presented in another part of this report, show that the amount of bituminous coal undercut by machines in 1899 was 43,963,933 short tons, against 32,413,144 short tons in 1898, 22,649,220 tons in 1897, and 16,424,932 tons in 1896.

The total number of men employed in all the coal mines of the United States in 1899 was 410,635, working an average of two hundred and fourteen days, as compared with 401,221 men for one hundred and ninety days in 1898, and 397,701 for one hundred and seventy-nine days in 1897.

In considering the coal product these reports include not only the coal marketed, either by shipment to distant points or sold locally, but also that consumed by the mine employees and by the mine operators themselves in locomotives, under stationary boilers, etc., in working the mine, and technically known as colliery consumption. There are occasional exceptions, where operators use only slack or waste, which would otherwise be thrown on the dump and no record kept, the miner not even being paid for it. These exceptions are few and the amount so comparatively small as not to materially affect the total. Coal consumed in the manufacture of coke is also included in this report.

The coal shipped, sold to local trade and employees, and used in the manufacture of coke is considered the marketable product. The colliery consumption averages about 8 per cent of the total product in anthracite production and about 1½ per cent in bituminous mining. The marketable product in 1899 amounted to 244,612,654 short tons, as compared with 212,053,378 short tons in 1898.

ANTHRACITE.

The production of anthracite coal in Pennsylvania amounted in 1899 to 53,944,647 long tons, or 60,418,005 short tons, valued at the mines at \$88,142,130, against 47,663,076 long tons, or 53,382,644 short tons, worth \$75,414,537 in 1898, and 46,974,714 long tons, or 52,611,680 short tons, valued at \$79,301,954 in 1897. Compared with 1898 the product in 1899 shows an increase of 6,281,571 long tons, or 7,035,361

short tons in amount, and of \$12,727,893. The percentage of increase in product was 13.2, while the value increased 16.9 per cent, the year's business being marked by an advance of 5 cents per ton in the general average price.

The year 1899 made a new record for anthracite production, as it did for many other branches of industry. Previous to that the maximum output for any one year was made in 1895, when, in spite of unfavorable market conditions, the production was pushed until it reached the then unprecedented total of 51,785,122 long tons, more than 5,000,000 tons in excess of the preceding year, and about 3,500,000 tons more than the average product of the three years preceding and succeeding 1895. The evil effects of this overproduction was felt throughout the anthracite trade for the next three years, and its influence would probably have affected the trade for 1899 had it not been for the extraordinary industrial revival of that year. The statistics of anthracite production, shipments, distribution for consumption, etc., are fully discussed by Mr. William W. Ruley, the chief of the bureau of anthracite coal statistics, in another portion of this report (see "Pennsylvania," under "Production of coal by States"), and need not be treated more in detail here.

In addition to the anthracite product of Pennsylvania, a small amount of coal which is true anthracite is mined in Colorado and New Mexico. The amount produced, however, is comparatively insignificant (96,196 short tons in 1899, and 47,095 tons in 1898), and has no appreciable effect upon the total. For the sake of convenience, therefore, this factor is included in the bituminous product, except in the preceding tables giving the production by fields. With this exception, reference to anthracite production throughout this and previous reports considers that of Pennsylvania only.

BITUMINOUS.

It has been customary in the preparation of these reports to include in the bituminous product all grades of coal produced in the United States outside of the anthracite fields of Pennsylvania. The product consequently embraces, in addition to strictly bituminous coals, those classed as semianthracite, semibituminous, splint, block, cannel, and lignite or brown coals, and the anthracite coal of Colorado and New Mexico. An exception is noted in the case of the semianthracite coal of the Bernice Basin, in Sullivan County, Pennsylvania, which is included in the anthracite product.

The aggregate product of all the coals treated as bituminous amounted in 1899 to 193,321,987 short tons, valued at \$167,935,304, as compared with 166,592,023 short tons, worth \$132,586,313 in 1898, and 147,609,985 tons, valued at \$119,567,224 in 1897. The activity which

prevailed in the iron and steel and other metallurgical and manufacturing industries in 1899 had an immediate effect upon the production of bituminous coal. Throughout the entire year the demand was fully equal to and often in excess of the operators' ability to meet it. The principal difficulty experienced by operators in 1899 was that brought about by the shortness of car supply, and, in some regions, by lack of miners, the demand for labor in other industrial lines causing an exodus of men from the mines with their more hazardous and less congenial employment. The labor conditions in 1899 were carried forward from the preceding year, and in consequence thereof the close of 1899 found many mines being equipped with undercutting machines. The statistics regarding the use of machines for mining bituminous coal, which are presented in another portion of this report, show that the number of machines in use had increased from 2,622 in 1898 to 3,125 in 1899, and that the machine-mined product had increased from 32,413,144 tons to 43,963,933 tons, 43 per cent of the total increase in the bituminous product.

Production of bituminous coal in the United States has shown an almost uninterrupted increase each year since 1880. In that year, according to the Tenth Census, the product was 42,831,758 short tons. During the nineteen years ending with 1899 there have been only three years in which the product was less than the year before. These were in 1885, 1889, and 1894.

Comparing the product of 1899 with some of the previous years it is seen that over 1898 there was a gain of 26,729,964 short tons, or 16 per cent in amount, and of \$35,348,991, or 26.7 per cent in value. As compared with 1897 the product in 1899 shows a gain of 45,712,002 short tons, an increase in two years considerably in excess of the total bituminous product in 1880. At the time of taking the Eleventh Census, in 1889, the total product of bituminous coal was 95,684,543 short tons. The product in 1899 shows an increase of over 100 per cent in ten years. As compared with the product reported by the Tenth Census the record for 1899 shows an output 4.5 times as large. No other country in the world has exhibited such a record.

For the first time in a period of twelve years the increase in the value of the bituminous product has been greater in proportion to the increase in tonnage. Since 1887 until the close of 1898 there had been no reaction against the decline in the average selling price obtained by the producers. The average price for all grades of coal included in the bituminous product in 1899 was 87 cents, as compared with 80 cents in 1898, 81 cents in 1897, and 83 cents in 1896. The price for 1899 would have shown a still greater improvement had it not been for the fact that most of the coal marketed in that year was sold on long contracts at prices made in 1898, and it was not until the latter part of the year that actual benefits of improved prices were secured.

The statistics of production in 1898 and 1899, by States, are presented in the following tables:

Coal product of the United States in 1898, by States.

State.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Alabama	82	4,926,828	107,576	145,808	1,355,071
Arkansas	17	1,167,103	13,256	25,120	.....
California and Alaska	7	135,568	19,996	4,724	.....
Colorado	101	3,132,676	130,305	117,820	695,546
Georgia and North Carolina	3	145,778	1,194	6,989	101,721
Idaho	2	.....	1,039	.....	.....
Illinois	329	15,596,888	2,149,808	852,603	.....
Indiana	141	4,398,078	387,790	130,810	4,065
Indian Territory	22	1,310,178	16,632	34,055	20,601
Iowa	187	3,981,362	572,063	65,417	.....
Kansas	110	3,079,601	277,022	49,932	.....
Kentucky	116	3,537,429	253,629	55,206	41,644
Maryland	31	4,618,990	36,941	18,953	.....
Michigan	17	232,155	75,622	7,945	.....
Missouri	124	2,393,315	249,662	45,344	.....
Montana	36	1,261,814	29,493	19,386	169,110
New Mexico	16	949,903	7,660	17,601	17,124
North Dakota	18	71,223	11,525	1,147	.....
Ohio	431	13,053,427	1,226,184	222,913	14,343
Oregon	5	54,305	3,290	589	.....
Pennsylvania	689	48,019,561	1,520,750	732,984	14,891,838
Tennessee	51	2,199,075	37,971	52,523	733,327
Texas	16	678,732	3,247	4,755	.....
Utah	20	485,716	11,542	9,845	86,606
Virginia	20	1,029,185	19,564	16,234	750,291
Washington	23	1,748,411	30,636	56,966	48,558
West Virginia	225	12,965,903	471,796	61,176	3,202,124
Wyoming	23	2,698,326	21,655	108,447	35,384
Total bituminous	2,862	133,871,530	7,687,848	2,865,292	22,167,353
Pennsylvania anthracite	340	47,088,581	1,238,066	5,055,997	.....
Grand total	3,202	180,960,111	8,925,914	7,921,289	22,167,353

Coal product of the United States in 1898, by States—Continued.

State.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>				
Alabama	6, 535, 283	\$4, 932, 776	\$0. 75	250	10, 733
Arkansas	1, 205, 479	1, 238, 778	1. 03	163	2, 555
California and Alaska	160, 288	405, 915	2. 53	265	314
Colorado	4, 076, 347	4, 686, 081	1. 15	220	6, 440
Georgia and North Carolina	255, 682	212, 537	. 83	292	534
Idaho	1, 039	2, 675	2. 57	157	7
Illinois	18, 599, 299	14, 567, 598	. 78	175	35, 026
Indiana	4, 920, 743	3, 994, 918	. 81	199	8, 971
Indian Territory	1, 381, 466	1, 827, 638	1. 32	198	3, 216
Iowa	4, 618, 842	5, 260, 716	1. 14	219	10, 262
Kansas	3, 406, 555	3, 703, 014	1. 09	194	7, 197
Kentucky	3, 887, 908	3, 084, 551	. 79	187	7, 614
Maryland	4, 674, 884	3, 532, 257	. 76	253	4, 818
Michigan	315, 722	462, 711	1. 47	245	715
Missouri	2, 688, 321	2, 871, 296	1. 07	198	6, 542
Montana	1, 479, 803	2, 324, 207	1. 57	216	2, 359
New Mexico	992, 288	1, 344, 750	1. 35	242	1, 873
North Dakota	83, 895	93, 591	1. 12	187	151
Ohio	14, 516, 867	12, 027, 336	. 83	169	26, 986
Oregon	58, 184	212, 184	3. 65	142	199
Pennsylvania	65, 165, 133	43, 352, 588	. 67	229	79, 611
Tennessee	3, 022, 896	2, 337, 512	. 77	234	6, 643
Texas	686, 734	1, 139, 763	1. 66	245	2, 130
Utah	593, 709	752, 252	1. 27	243	739
Virginia	1, 815, 274	1, 070, 417	. 59	230	1, 855
Washington	1, 884, 571	3, 352, 798	1. 78	270	3, 145
West Virginia	16, 700, 999	10, 131, 264	. 61	218	21, 607
Wyoming	2, 863, 812	3, 664, 190	1. 28	242	3, 475
Total bituminous	166, 592, 023	132, 586, 313	. 80	211	255, 717
Pennsylvania anthracite	53, 382, 644	75, 414, 537	1. 41	152	145, 504
Grand total	219, 974, 667	208, 000, 850	. 95	190	401, 221

COAL.

337.

Coal product of the United States in 1899 by States.

State.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Alabama	100	4,701,612	79,994	155,514	2,656,296
Arkansas	22	811,366	10,296	21,892	.....
California and Alaska	7	151,265	5,275	4,432	.....
Colorado	108	3,681,341	118,153	106,988	869,742
Georgia and North Carolina	3	174,080	926	8,434	76,567
Idaho	1	.....	20	.....	.....
Illinois	550	21,871,930	1,936,515	630,574	.....
Indiana	136	5,465,609	376,574	160,621	3,719
Indian Territory	29	1,444,063	12,280	54,222	26,862
Iowa	230	4,479,743	622,401	75,335	.....
Kansas	123	3,524,497	276,918	50,852	.....
Kentucky	97	4,139,199	282,736	67,136	118,184
Maryland	34	4,716,581	68,750	22,065	.....
Michigan	23	574,280	34,191	16,237	.....
Missouri	166	2,691,433	289,826	44,555	.....
Montana	34	1,294,614	29,686	34,249	137,902
New Mexico	18	1,021,801	14,128	14,785	.....
North Dakota	25	77,731	20,788	290	.....
Ohio	441	14,880,893	1,393,025	211,992	14,360
Oregon	3	78,608	6,656	1,624	.....
Pennsylvania	687	53,671,963	1,525,772	972,692	17,979,748
Tennessee	52	2,444,655	86,351	55,675	743,978
Texas	18	839,166	34,690	9,976	.....
Utah	25	753,881	13,303	13,046	5,819
Virginia	25	1,175,504	23,634	19,004	887,649
Washington	26	1,897,962	20,281	61,443	50,195
West Virginia	231	15,044,272	476,996	87,022	3,644,705
Wyoming	31	3,584,667	32,429	188,196	32,100
Total bitumi- nous	3,245	155,192,716	7,792,594	3,088,851	27,247,826
Pennsylvania an- thracite	359	53,562,030	1,281,962	5,574,013	.....
Grand total	3,604	208,754,746	9,074,556	8,662,864	27,247,826

Coal product of the United States in 1899 by States—Continued.

State.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>				
Alabama	7, 593, 416	\$8, 256, 462	\$1. 09	238	13, 481
Arkansas	843, 554	989, 383	1. 17	156	2, 313
California and Alaska	160, 972	430, 636	2. 68	287	369
Colorado	4, 776, 224	5, 363, 667	1. 12	246	7, 166
Georgia and North Carolina	260, 007	268, 309	1. 03	291	637
Idaho	20	100	5. 00		
Illinois	24, 439, 019	20, 744, 553	. 85	228	36, 756
Indiana	6, 006, 523	5, 285, 018	. 82	218	9, 712
Indian Territory	1, 537, 427	2, 199, 785	1. 43	212	4, 084
Iowa	5, 177, 479	6, 397, 338	1. 24	229	10, 971
Kansas	3, 852, 267	4, 478, 112	1. 16	226	8, 000
Kentucky	4, 607, 255	3, 618, 222	. 79	224	7, 461
Maryland	4, 807, 396	3, 667, 056	. 76	275	4, 624
Michigan	624, 908	870, 152	1. 39	232	1, 291
Missouri	3, 025, 814	3, 591, 945	1. 20	212	7, 136
Montana	1, 496, 451	2, 347, 757	1. 57	238	2, 378
New Mexico	1, 050, 714	1, 461, 865	1. 39	257	1, 750
North Dakota	98, 809	117, 500	1. 19	154	210
Ohio	16, 500, 270	14, 361, 903	. 87	200	26, 038
Oregon	86, 868	260, 917	3. 00	238	124
Pennsylvania	74, 150, 175	56, 247, 791	. 76	245	82, 812
Tennessee	3, 330, 659	2, 940, 644	. 88	252	6, 949
Texas	883, 832	1, 334, 895	1. 51	256	2, 410
Utah	786, 049	997, 271	1. 27	265	743
Virginia	2, 105, 791	1, 304, 241	. 62	252	1, 960
Washington	2, 029, 881	3, 603, 989	1. 78	259	3, 330
West Virginia	19, 252, 995	12, 053, 268	. 63	242	23, 625
Wyoming	3, 837, 392	4, 742, 525	1. 24	261	4, 697
Total bituminous	193, 321, 987	167, 935, 304	. 87	234	271, 027
Pennsylvania anthracite	60, 418, 005	88, 142, 130	1. 46	173	139, 608
Grand total...	253, 739, 992	256, 077, 434	1. 01	214	410, 635

PRODUCTION IN PREVIOUS YEARS.

In the following table is shown the annual production of anthracite and bituminous coal, with the value of each and of both combined, since 1880. The quantities are expressed both in long tons of 2,240 pounds and in short tons of 2,000 pounds. In the twenty years covered by this statement the yield of anthracite coal in Pennsylvania has increased from 25,580,189 long tons or 28,649,811 short tons, valued at \$42,196,678, to 53,944,647 long tons or 60,418,005 short tons, valued at \$88,142,130 in 1899, an increase in amount of 28,364,458 long tons or 31,768,194 short tons, and of \$45,945,952 in value. The product increased 111 per cent and the value 109 per cent. It will also be observed that while the product in 1899 was the largest ever obtained, the value was nearly \$1,000,000 less than that of 1888, in which year the average price was \$2.16 per long ton, the highest recorded in the last twenty years.

The amount of bituminous coal produced in 1899 was 4.5 times that of 1880, while the value was only a little over 3 times as much. The average price for bituminous coal in 1880 was about \$1.25 per short ton. In 1899 it was 87 cents.

Annual production of coal in the United States since 1880.

Year.	Bituminous coal.		
	Long tons of 2,240 pounds.	Short tons of 2,000 pounds.	Value.
1880.....	38,242,641	42,831,758	\$53,443,718
1881.....	48,365,341	53,961,012	60,224,344
1882.....	60,861,190	68,164,533	76,076,487
1883.....	68,531,500	76,755,280	82,237,800
1884.....	73,730,539	82,578,204	77,417,066
1885.....	64,840,668	72,621,548	82,347,648
1886.....	66,646,947	74,644,581	78,481,056
1887.....	79,073,227	88,562,014	98,004,656
1888.....	91,107,002	102,039,843	101,860,529
1889.....	85,432,717	95,684,643	94,504,745
1890.....	99,377,073	111,302,322	110,420,801
1891.....	105,268,962	117,901,237	117,188,400
1892.....	113,264,792	126,856,567	125,124,381
1893.....	114,629,671	128,385,231	122,751,618
1894.....	106,089,647	118,820,405	107,653,501
1895.....	120,641,244	135,118,193	115,779,771
1896.....	122,893,104	137,640,276	114,891,515
1897.....	131,794,630	147,609,985	119,567,224
1898.....	148,742,878	166,592,023	132,586,313
1899.....	172,608,917	193,321,987	167,935,304

Annual production of coal in the United States since 1880—Continued.

Year.	Pennsylvania anthracite.		
	Long tons of 2,240 pounds.	Short tons of 2,000 pounds.	Value.
1880.....	25,580,189	28,649,811	\$42,196,678
1881.....	28,500,016	31,920,018	64,125,036
1882.....	31,358,264	35,121,256	70,556,094
1883.....	34,336,469	38,456,845	77,257,055
1884.....	33,175,756	37,156,847	66,351,512
1885.....	34,228,548	38,335,974	76,671,948
1886.....	34,853,077	39,035,446	76,119,120
1887.....	37,578,747	42,088,197	84,552,181
1888.....	41,624,611	46,619,564	89,020,483
1889.....	40,665,152	45,544,970	65,721,578
1890.....	41,489,858	46,468,641	66,383,772
1891.....	45,236,992	50,665,431	73,944,735
1892.....	46,850,450	52,472,504	82,442,000
1893.....	48,185,306	53,967,543	85,687,078
1894.....	46,358,144	51,921,121	78,488,063
1895.....	51,785,122	57,999,337	82,019,272
1896.....	48,523,287	54,346,081	81,748,651
1897.....	46,974,714	52,611,680	79,301,954
1898.....	47,663,076	53,382,644	75,414,537
1899.....	53,944,647	60,418,005	88,142,130

Annual production of coal in the United States since 1880—Continued.

Year.	Total.		
	Long tons.	Short tons.	Value.
1880.....	63, 822, 830	71, 481, 569	\$95, 640, 396
1881.....	76, 865, 357	85, 881, 030	124, 349, 380
1882.....	92, 219, 454	103, 285, 789	146, 632, 581
1883.....	102, 867, 969	115, 212, 125	159, 494, 855
1884.....	106, 906, 295	119, 735, 051	143, 768, 578
1885.....	99, 069, 216	110, 957, 522	159, 019, 596
1886.....	101, 500, 024	113, 680, 027	154, 600, 176
1887.....	116, 651, 974	130, 650, 211	182, 498, 737
1888.....	132, 731, 613	148, 659, 407	190, 881, 012
1889.....	126, 097, 869	141, 229, 613	160, 226, 323
1890.....	140, 866, 931	157, 770, 963	176, 804, 573
1891.....	150, 505, 954	168, 566, 668	191, 133, 135
1892.....	160, 115, 242	179, 329, 071	207, 566, 381
1893.....	162, 814, 977	182, 352, 774	208, 438, 696
1894.....	152, 447, 791	170, 741, 526	186, 141, 564
1895.....	172, 426, 366	193, 117, 530	197, 799, 043
1896.....	171, 416, 390	191, 986, 357	196, 640, 166
1897.....	178, 769, 344	200, 221, 665	198, 869, 178
1898.....	196, 405, 953	219, 974, 667	208, 000, 850
1899.....	226, 553, 564	253, 739, 992	256, 077, 434

The statistics of production in the separate States for years prior to 1886 are so incomplete that a statement showing them would be largely a matter of guesswork and of no practical value. Since 1886 the statistics have been collected regularly and systematically by the Geological Survey, with the exception of 1889, when the information was gathered by the Eleventh United States Census. The total amount and value of coal produced in the United States from 1886 to 1899, inclusive, is shown in the following table. The quantities are expressed uniformly in short tons of 2,000 pounds.

Amount and value of coal produced in the United States, by States and Territories, from 1886 to 1899.

State or Territory.	1886.		1887.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	1,800,000	\$2,574,000	1,950,000	\$2,535,000
Arkansas	125,000	200,000	129,600	194,400
California	100,000	300,000	50,000	150,000
Colorado	1,368,338	3,215,594	1,791,735	3,941,817
Georgia	223,000	334,500	313,715	470,573
Idaho	1,500	6,000	500	2,000
Illinois	9,248,435	10,263,543	10,278,890	11,152,596
Indiana	3,000,000	3,450,000	3,217,711	4,324,604
Indian Territory	534,580	855,328	685,911	1,286,692
Iowa	4,315,779	5,391,151	4,473,828	5,991,735
Kansas	1,400,000	1,680,000	1,596,879	2,235,631
Kentucky	1,550,000	1,782,500	1,933,185	2,223,163
Maryland	2,517,577	2,391,698	3,278,023	3,114,122
Michigan	60,434	90,651	71,461	107,191
Missouri	1,800,000	2,340,000	3,209,916	4,298,994
Montana	49,846	174,460	10,202	35,707
Nebraska			1,500	3,000
New Mexico	271,285	813,855	508,034	1,524,102
North Dakota	25,955	41,277	21,470	32,205
Ohio	8,435,211	8,013,450	10,301,708	9,096,848
Oregon	45,000	112,500	31,696	70,000
Pennsylvania:				
Anthracite	36,696,475	71,558,126	39,506,255	79,365,244
Bituminous	27,094,501	21,016,235	31,516,856	27,806,941
Rhode Island			6,000	16,250
Tennessee	1,714,290	1,971,434	1,900,000	2,470,000
Texas	100,000	185,000	75,000	150,000
Utah	200,000	420,000	180,021	360,042
Virginia	684,951	684,951	825,263	773,360
Washington	423,525	952,931	772,612	1,699,746
West Virginia	4,005,796	3,805,506	4,881,620	4,594,979
Wyoming	829,355	2,488,065	1,170,318	3,510,954
Total product sold.	108,618,833	147,112,755	124,689,909	173,537,896
Colliery consumption..	5,061,194	.....	5,960,302	8,960,841
Total	113,680,027	147,112,755	130,650,211	182,498,737

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1888.		1889.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	2,900,000	\$3,335,000	3,572,983	\$3,961,491
Arkansas	276,871	415,306	279,584	395,836
California	95,000	380,000	184,179	434,382
Colorado	2,185,477	4,808,049	2,544,144	3,843,992
Georgia	180,000	270,000	226,156	339,382
Idaho	400	1,800		
Illinois	14,655,188	16,413,811	12,104,272	11,755,203
Indiana	3,140,979	4,397,370	2,845,057	2,887,852
Indian Territory	761,986	1,432,072	752,832	1,323,807
Iowa	4,952,440	6,438,172	4,095,358	5,426,509
Kansas	1,850,000	2,775,000	2,221,043	3,297,288
Kentucky	2,570,000	3,084,000	2,399,755	2,374,339
Maryland	3,479,470	3,293,070	2,939,715	2,517,474
Michigan	81,407	135,221	67,431	115,011
Missouri	3,909,967	8,650,800	2,557,823	3,479,057
Montana	41,467	145,135	363,301	880,773
Nebraska	1,500	3,375	1,500	4,500
New Mexico	626,665	1,879,995	486,463	870,468
North Carolina			(a)	
North Dakota	34,000	119,000	28,907	41,431
Ohio	10,910,951	10,147,180	9,976,787	9,355,400
Oregon	75,000	225,000	(b)	
Pennsylvania:				
Anthracite	43,922,897	85,649,649	c 45,598,487	65,873,514
Bituminous	33,796,727	32,106,891	36,174,089	27,953,315
Rhode Island	4,000	11,000	2,000	6,000
Tennessee	1,967,297	2,164,026	1,925,689	2,338,309
Texas	90,000	184,500	128,216	340,620
Utah	258,961	543,818	236,651	377,456
Virginia	1,073,000	1,073,000	865,786	804,475
Washington	1,215,750	3,647,250	1,030,578	2,393,238
West Virginia	5,498,800	6,048,680	6,231,880	5,086,584
Wyoming	1,481,540	4,444,620	1,388,947	1,748,617
Total product sold..	142,037,740	204,222,790	141,229,613	160,226,323
Colliery consumption..	6,621,667	7,295,834		
Total	148,659,407	211,518,624	141,229,613	160,226,323

a Product included in Georgia.

b Product included in California.

c Includes product of anthracite in Colorado and New Mexico.

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1890.		1891.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	4, 090, 409	\$4, 202, 469	4, 759, 781	\$5, 087, 596
Arkansas	399, 888	514, 595	542, 379	647, 560
California	110, 711	283, 019	93, 301	204, 902
Colorado	3, 094, 003	4, 344, 196	3, 512, 632	4, 800, 000
Georgia	228, 337	238, 315	171, 000	256, 500
Illinois	15, 274, 727	14, 171, 230	15, 660, 698	14, 237, 074
Indiana	3, 305, 737	3, 259, 233	2, 973, 474	3, 070, 918
Indian Territory	869, 229	1, 579, 188	1, 091, 032	1, 897, 037
Iowa	4, 021, 739	4, 995, 739	3, 825, 495	4, 807, 999
Kansas	2, 259, 922	2, 947, 517	2, 716, 705	3, 557, 303
Kentucky	2, 701, 496	2, 472, 119	2, 916, 069	2, 715, 600
Maryland	3, 357, 813	2, 899, 572	3, 820, 239	3, 082, 515
Michigan	74, 977	149, 195	80, 307	133, 387
Missouri	2, 735, 221	3, 382, 858	2, 674, 606	3, 283, 242
Montana	517, 477	1, 252, 492	541, 861	1, 228, 630
Nebraska	1, 500	4, 500	1, 500	4, 500
New Mexico	375, 777	504, 390	462, 328	779, 018
North Carolina	10, 262	17, 864	20, 355	39, 365
North Dakota	30, 000	42, 000	30, 000	42, 000
Ohio	11, 494, 506	10, 783, 171	12, 868, 683	12, 106, 115
Oregon	61, 514	177, 875	51, 826	155, 478
Pennsylvania:				
Anthracite	46, 468, 641	66, 383, 772	50, 665, 431	73, 944, 735
Bituminous	42, 302, 173	35, 376, 916	42, 788, 490	37, 271, 053
Rhode Island			500	10, 000
Tennessee	2, 169, 585	2, 395, 746	2, 413, 678	2, 668, 188
Texas	184, 440	465, 900	172, 100	412, 360
Utah	318, 159	552, 390	371, 045	666, 045
Virginia	784, 011	589, 925	736, 399	611, 654
Washington	1, 263, 689	3, 426, 590	1, 056, 249	2, 437, 270
West Virginia	7, 394, 654	6, 208, 128	9, 220, 665	7, 359, 816
Wyoming	1, 870, 366	3, 183, 669	2, 327, 841	3, 555, 275
Total	157, 770, 963	176, 804, 573	168, 566, 669	191, 133, 135

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1892.		1893.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	5, 529, 312	\$5, 788, 898	5, 136, 935	\$5, 096, 792
Arkansas	535, 558	666, 230	574, 763	773, 347
California	85, 178	209, 711	72, 603	167, 555
Colorado	3, 510, 830	5, 685, 112	4, 102, 389	5, 104, 602
Georgia	215, 498	212, 761	372, 740	365, 972
Illinois	17, 862, 276	16, 243, 645	19, 949, 564	17, 827, 595
Indiana	3, 345, 174	3, 620, 582	3, 791, 851	4, 055, 372
Indian Territory	1, 192, 721	2, 043, 479	1, 252, 110	2, 235, 209
Iowa	3, 918, 491	5, 175, 060	3, 972, 229	5, 110, 480
Kansas	3, 007, 276	3, 955, 595	2, 652, 546	3, 375, 740
Kentucky	3, 025, 313	2, 771, 238	3, 007, 179	2, 613, 569
Maryland	3, 419, 962	3, 063, 580	3, 716, 041	3, 267, 317
Michigan	77, 990	121, 314	45, 979	82, 462
Missouri	2, 733, 949	3, 369, 659	2, 897, 442	3, 562, 757
Montana	564, 648	1, 330, 847	892, 309	1, 772, 116
Nebraska	1, 500	4, 500		
New Mexico	661, 330	1, 074, 601	665, 094	979, 044
North Carolina	6, 679	9, 599	17, 000	25, 500
North Dakota	40, 725	39, 250	49, 630	56, 250
Ohio	13, 562, 927	12, 722, 745	13, 253, 646	12, 351, 139
Oregon	34, 661	148, 546	41, 683	164, 500
Pennsylvania:				
Anthracite	52, 472, 504	82, 442, 000	53, 967, 543	85, 687, 078
Bituminous	46, 694, 576	39, 017, 164	44, 070, 724	35, 260, 674
Tennessee	2, 092, 064	2, 355, 441	1, 902, 258	2, 048, 449
Texas	245, 690	569, 333	302, 206	688, 407
Utah	361, 013	562, 625	413, 205	611, 092
Virginia	675, 205	578, 429	820, 339	692, 748
Washington	1, 213, 427	2, 763, 547	1, 264, 877	2, 920, 876
West Virginia	9, 738, 755	7, 852, 114	10, 708, 578	8, 251, 170
Wyoming	2, 503, 839	3, 168, 776	2, 439, 311	3, 290, 904
Total	179, 329, 071	207, 566, 381	182, 352, 774	208, 438, 696

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1894.		1895.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	4,397,178	\$4,085,535	5,693,775	\$5,126,822
Arkansas	512,626	631,988	598,322	751,156
California	67,247	155,620	75,453	175,778
Colorado	2,831,409	3,516,340	3,082,982	3,675,185
Georgia	354,111	299,290	260,998	215,863
Illinois	17,113,576	15,282,111	17,735,864	14,239,157
Indiana	3,423,921	3,295,034	3,995,892	3,642,623
Indian Territory	969,606	1,541,293	1,211,185	1,737,254
Iowa	3,967,253	4,997,939	4,156,074	4,982,102
Kansas	3,388,251	4,178,998	2,926,870	3,481,981
Kentucky	3,111,192	2,749,932	3,357,770	2,890,247
Maryland	3,501,428	2,687,270	3,915,585	3,160,592
Michigan	70,022	103,049	112,322	180,016
Missouri	2,245,039	3,634,564	2,372,393	2,651,612
Montana	927,395	1,887,390	1,504,193	2,850,906
Nevada	150	475		
New Mexico	597,196	935,857	720,654	1,072,520
North Carolina	16,900	29,675	24,900	41,350
North Dakota	42,015	47,049	a 39,197	a 42,046
Ohio	11,909,856	9,841,723	13,355,806	10,618,477
Oregon	47,521	183,914	73,685	247,901
Pennsylvania:				
Anthracite	51,921,121	78,488,063	57,999,337	82,019,272
Bituminous	39,912,463	29,479,820	50,217,228	35,980,857
Tennessee	2,180,879	2,119,481	2,535,644	2,349,032
Texas	420,848	976,458	484,959	913,138
Utah	431,550	603,479	471,836	617,349
Virginia	1,229,083	933,576	1,368,324	869,873
Washington	1,106,470	2,578,441	1,191,410	2,577,958
West Virginia	11,627,757	8,706,808	11,387,961	7,710,575
Wyoming	2,417,463	3,170,392	2,246,911	2,977,901
Total	170,741,526	186,141,564	193,117,530	197,799,043

a Includes South Dakota.

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1896.		1897.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	5,748,697	\$5,174,135	5,893,770	\$5,192,085
Arkansas	675,374	755,577	856,190	903,993
California	<i>a</i> 93,776	220,523	<i>a</i> 103,912	265,236
Colorado	3,112,400	3,606,642	3,361,703	3,947,186
Georgia	<i>b</i> 246,359	179,770	<i>b</i> 217,149	167,466
Idaho			645	2,150
Illinois	19,786,626	15,809,736	20,072,758	14,472,529
Indiana	3,905,779	3,261,737	4,151,169	3,472,348
Indian Territory	1,366,646	1,918,115	1,336,380	1,787,358
Iowa	3,954,028	4,628,022	4,611,865	5,219,503
Kansas	2,884,801	3,295,032	3,054,012	3,602,326
Kentucky	3,333,478	2,684,306	3,602,097	2,828,329
Maryland	4,143,936	3,299,928	4,442,128	3,363,996
Michigan	92,882	150,631	223,592	325,416
Missouri	2,331,542	2,518,194	2,665,626	2,887,884
Montana	1,543,445	2,279,672	1,647,882	2,897,408
Nebraska	(<i>c</i>)	(<i>c</i>)	(<i>f</i>)	(<i>f</i>)
New Mexico	622,626	930,381	716,981	991,611
North Carolina	(<i>d</i>)	(<i>d</i>)	(<i>d</i>)	(<i>d</i>)
North Dakota	78,050	84,908	77,246	83,803
Ohio	12,875,202	10,253,461	12,196,942	9,535,409
Oregon	101,721	294,564	101,755	313,890
Pennsylvania:				
Anthracite	54,346,081	81,748,651	52,611,680	79,301,954
Bituminous	49,557,453	35,368,249	54,417,974	37,463,519
Tennessee	2,663,106	2,281,295	2,888,849	2,329,534
Texas	544,015	896,251	639,341	972,323
Utah	418,627	500,547	521,560	618,230
Virginia	1,254,723	848,851	1,528,302	1,021,918
Washington	1,195,504	2,396,078	1,434,112	2,777,687
West Virginia	12,876,296	8,336,685	14,248,159	8,987,393
Wyoming	<i>e</i> 2,233,184	2,918,225	2,597,886	3,136,694
Total	191,986,357	196,640,166	200,221,665	198,869,178

a Includes Alaska.

b Includes North Carolina.

c Included in Wyoming.

d Included in Georgia.

e Includes Nebraska.

f Included in Idaho.

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1898.		1899.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	6,535,283	\$4,932,776	7,593,416	\$8,256,462
Arkansas	1,205,479	1,238,778	843,554	989,383
California	<i>a</i> 160,288	405,915	160,972	430,636
Colorado	4,076,347	4,686,081	4,776,224	5,363,667
Georgia	<i>b</i> 255,682	212,537	<i>b</i> 260,007	268,309
Idaho	1,039	2,675	20	100
Illinois	18,599,299	14,567,598	24,439,019	20,744,553
Indiana	4,920,743	3,994,918	6,006,523	5,285,018
Indian Territory	1,381,466	1,827,638	1,537,427	2,199,785
Iowa	4,618,842	5,260,716	5,177,479	6,397,338
Kansas	3,406,555	3,703,014	3,852,267	4,478,112
Kentucky	3,887,908	3,084,551	4,607,255	3,618,222
Maryland	4,674,884	3,532,257	4,807,396	3,667,056
Michigan	315,722	462,711	624,708	870,152
Missouri	2,688,321	2,871,296	3,025,814	3,591,945
Montana	1,479,803	2,324,207	1,496,451	2,347,757
New Mexico	992,288	1,344,750	1,050,714	1,461,865
North Carolina	(<i>c</i>)	(<i>c</i>)	(<i>c</i>)	(<i>c</i>)
North Dakota	83,895	93,591	98,809	117,500
Ohio	14,516,867	12,027,336	16,500,270	14,361,903
Oregon	58,184	212,184	86,888	260,917
Pennsylvania:				
Anthracite	53,382,644	75,414,537	60,418,005	88,142,130
Bituminous	65,165,133	43,352,588	74,150,175	56,247,791
Tennessee	3,022,896	2,337,512	3,330,659	2,940,644
Texas	686,734	1,139,763	883,832	1,334,895
Utah	593,709	752,252	786,049	997,271
Virginia	1,815,274	1,070,417	2,105,791	1,304,241
Washington	1,884,571	3,352,798	2,029,881	3,603,989
West Virginia	16,700,999	10,131,264	19,252,995	12,053,268
Wyoming	2,863,812	3,664,190	3,837,392	4,742,525
Total	219,974,667	208,000,850	253,739,992	256,077,434

a Includes Alaska.*b* Includes North Carolina.*c* Included in Georgia.

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	Increase, 1899.		Per cent of Increase.	
	Product.	Value.	Product.	Value.
	<i>Short tons.</i>			
Alabama	1, 058, 133	\$3, 323, 686	16. 2	67. 4
Arkansas	^a 361, 925	^a 249, 395	^a 30. 0	^a 20. 1
California	684	24, 721	. 4	6. 1
Colorado	699, 877	677, 586	17. 2	14. 5
Georgia	4, 325	55, 772	1. 7	26. 2
Idaho	^a 1, 019	^a 2, 575	^a 98. 1	^a 96. 3
Illinois	5, 839, 720	6, 176, 955	31. 4	42. 4
Indiana	1, 085, 780	1, 290, 100	22. 1	32. 3
Indian Territory	155, 961	372, 147	11. 3	20. 4
Iowa	558, 637	1, 136, 622	12. 1	21. 6
Kansas	445, 712	775, 098	13. 1	20. 9
Kentucky	719, 347	533, 671	18. 5	17. 3
Maryland	132, 512	124, 799	2. 8	3. 8
Michigan	308, 986	407, 441	97. 9	88. 1
Missouri	337, 493	720, 649	12. 6	25. 1
Montana	16, 648	23, 550	1. 1	1. 0
New Mexico	58, 426	117, 115	5. 9	8. 7
North Carolina	(b)	(b)		
North Dakota	14, 914	23, 909	17. 8	25. 5
Ohio	1, 983, 403	2, 334, 567	13. 7	19. 4
Oregon	28, 704	48, 733	49. 3	23. 0
Pennsylvania:				
Anthracite	7, 035, 361	12, 727, 593	13. 2	16. 9
Bituminous	8, 985, 042	12, 895, 203	13. 8	29. 7
Tennessee	307, 763	603, 132	10. 2	25. 8
Texas	197, 098	195, 132	28. 7	17. 1
Utah	192, 340	245, 019	32. 4	32. 6
Virginia	290, 517	233, 824	16. 0	21. 8
Washington	145, 310	251, 191	7. 7	7. 5
West Virginia	2, 551, 996	1, 922, 004	15. 3	19. 0
Wyoming	973, 580	1, 078, 335	34. 0	29. 4
Total	33, 765, 325	48, 076, 584	15. 3	23. 1

^a Decrease.

^b Included in Georgia.

From the foregoing table it is seen that there was only one State of any importance in which the product of 1899 was less than that of the preceding year. Arkansas is the notable exception to the general increased production. The decrease in Arkansas was due to protracted strikes in a number of the largest mines in the State, so that in a year of exceptional activity in coal production Arkansas shows a loss of 30 per cent in output. Idaho shows a decrease of 98 per cent, but of insignificant amount. Alaska's product decreased, and there was also a slight falling off in the production in Georgia, but this latter does not show in the table, as the loss was made up by an increase in North Carolina, whose product is combined with Georgia's. The greatest increase was in the bituminous product of Pennsylvania, a natural result of the enormous production of iron and steel in 1899, as Pittsburgh may be said to be the center of the iron industry.¹ The next largest increase was in Pennsylvania anthracite, which added over 7,000,000 short tons to its product in 1898. More than one-fourth of the total increase in 1899 was from the bituminous mines of Pennsylvania, while the combined increase of bituminous and anthracite coal in Pennsylvania made up nearly one-half of the total increase in the country. Illinois, the second State in total production, was second also in amount of increase, adding 5,839,720 short tons, or 31.4 per cent, to the product of 1898. Similarly West Virginia and Ohio, third and fourth in rank, were third and fourth, respectively, in amount of increased production. Indiana was fifth and Alabama sixth in point of increased tonnage. The honor of having the largest percentage of increase belongs to Michigan, whose product in 1899 was 97 per cent larger than it was in 1898. With five exceptions, the product of each State and Territory in 1899 was the largest in its history. The exceptions are Alaska, Arkansas, Idaho, and Georgia, the four States whose product decreased in 1899 as compared with 1898, and Missouri, whose product both in 1887 and 1888 exceeded that of 1899.

¹ It is estimated by Mr. James M. Swank, general manager of the American Iron and Steel Association, that 20,500,000 long tons of coal were used in making pig iron in 1899. The amount consumed in the manufacture of rolled iron and steel added about 10,500,000 tons and foundry consumption 2,000,000 tons more; so that 33,000,000 long tons, or about 37,000,000 short tons, of the 1899 product went directly into the manufacture of iron and steel. In 1898, using the same bases for estimates, the consumption of coal in blast furnaces, rolling mills, and foundries was 28,500,000 long tons, or approximately 32,000,000 short tons. Allegheny County, Pennsylvania, produced 24 per cent of the total pig-iron product in 1899, 34 per cent of the output of Bessemer steel ingots, 50 per cent of open-hearth steel ingots, nearly 40 per cent of the total steel product, over 26 per cent of the output of steel rails, and 64 per cent of the production of structural shapes.

The distribution of the product for consumption, the value, and the statistics of labor employed for a period of eleven years is shown in the following table:

Production of coal in the United States from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Manufactured into coke.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1889.....		113,776,701	8,508,699	5,382,265	13,561,848
1890.....		128,383,658	9,009,285	5,063,953	15,331,760
1891.....		92,615,738	7,816,891	1,750,169	15,718,440
1892.....		146,372,098	9,704,678	6,210,767	17,041,528
1893.....		152,941,890	9,728,815	6,712,284	12,969,785
1894.....		142,833,319	8,764,538	6,307,296	12,836,373
1895.....	2,904	158,380,289	9,655,505	6,677,539	18,404,197
1896.....	2,954	159,176,155	9,502,927	7,184,832	16,122,443
1897.....	2,804	165,603,626	9,914,742	6,941,419	17,761,878
1898.....	3,202	180,960,111	8,925,914	7,921,289	22,167,353
1899.....		208,754,746	9,074,556	8,662,864	27,247,826

Year.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>				
1889.....	141,229,513	\$160,226,323	\$1.13		
1890.....	157,788,656	176,804,573	1.12	216	318,204
1891.....	117,901,238	117,188,400	.994	223	205,803
1892.....	179,329,071	207,566,381	1.16	212	341,943
1893.....	182,352,774	208,438,696	1.14	201	363,309
1894.....	170,741,526	186,141,564	1.09	178	376,206
1895.....	193,117,530	197,799,043	1.02	195	382,879
1896.....	191,986,357	196,640,166	1.02	185	386,656
1897.....	200,221,665	198,869,178	.99	179	397,701
1898.....	219,974,667	208,000,850	.95	190	401,221
1899.....	253,739,992	256,077,434	1.01	214	410,635

RANK OF COAL-PRODUCING STATES.

In the following tables, which extend over a period of three years, the coal-producing States are arranged according to rank, first in amount of production, and then in the value of the product, with the percentage of both amount and value contributed by each State. Pennsylvania, of course, ranks first in both particulars, with Illinois

second. West Virginia stands third in amount in all three years, being followed by Ohio. In the value of their products, the rank of these two States is reversed each year, Ohio being third and West Virginia fourth. Alabama was fifth in production in all three years, but sixth in value except in 1899. These five are the only States that have maintained their relative positions with any kind of regularity. Changes in the standing of each of the other States have occurred nearly every year without, however, exercising much influence on the total or altering materially the percentage contributed by each.

Rank of coal-producing States in 1897, with amount and value of product and percentage of each.

1897.							
Production.				Value.			
Rank.	State or Territory.	Amount.	Per cent of total product.	Rank.	State or Territory.	Value.	Per cent of total value.
1	Pennsylvania:	<i>Short tons.</i>		1	Pennsylvania:		
	Anthracite	52,611,680	26.3		Anthracite	\$79,301,954	39.9
	Bituminous	54,417,974	27.2		Bituminous	37,463,519	18.8
2	Illinois	20,072,758	10.0	2	Illinois	14,472,529	7.3
3	West Virginia	14,248,159	7.1	3	Ohio	9,535,409	4.8
4	Ohio	12,196,942	6.1	4	West Virginia	8,987,393	4.5
5	Alabama	5,893,770	2.9	5	Iowa	5,219,503	2.6
6	Iowa	4,611,865	2.3	6	Alabama	5,192,085	2.6
7	Maryland	4,442,128	2.2	7	Colorado	3,947,186	2.0
8	Indiana	4,151,169	2.1	8	Kansas	3,602,326	1.8
9	Kentucky	3,602,097	1.8	9	Indiana	3,472,348	1.7
10	Colorado	3,361,703	1.7	10	Maryland	3,363,996	1.7
11	Kansas	3,054,012	1.5	11	Wyoming	3,136,694	1.6
12	Tennessee	2,888,849	1.5	12	Montana	2,897,408	1.5
13	Missouri	2,665,626	1.3	13	Missouri	2,887,884	1.5
14	Wyoming	2,597,886	1.3	14	Kentucky	2,828,329	1.4
15	Montana	1,647,882		15	Washington	2,777,687	1.4
16	Virginia	1,528,302		16	Tennessee	2,329,534	1.2
17	Washington	1,434,112		17	Indian Territory	1,787,358	
18	Indian Territory	1,336,380		18	Virginia	1,021,918	
19	Arkansas	856,190		19	New Mexico	991,611	
20	New Mexico	716,981		20	Texas	972,323	
21	Texas	639,341		21	Arkansas	903,993	
22	Utah	521,560	4.7	22	Utah	618,280	8.7
23	Michigan	223,592		23	Michigan	325,416	
24	Georgia	a 217,149		24	Oregon	313,890	
25	California	b 103,912		25	California	b 265,236	
26	Oregon	101,755		26	Georgia	a 167,466	
27	North Dakota	77,246		27	North Dakota	83,803	
28	Idaho	c 645		28	Idaho	c 2,150	
Total		200,221,665	100.0	Total		198,869,178	100.0

a Includes North Carolina.

b Includes Alaska.

c Includes Nebraska.

Rank of coal-producing States in 1898, with amount and value of product, and percentage of each.

1898.						
Production.				Value.		
Rank.	State or Territory.	Amount.	Per cent of total product.	Rank.	State or Territory.	Value.
						Per cent of total value.
	Pennsylvania:	Short tons.			Pennsylvania:	
1	Anthracite	53,382,644	24.3	1	Anthracite	\$75,414,537
	Bituminous	65,165,133	29.6		Bituminous	43,352,588
2	Illinois	18,599,299	8.5	2	Illinois	14,567,598
3	West Virginia	16,700,999	7.6	3	Ohio	12,027,336
4	Ohio	14,516,867	6.6	4	West Virginia	10,131,264
5	Alabama	6,535,283	3.0	5	Iowa	5,260,716
6	Indiana	4,920,743	2.2	6	Alabama	4,932,776
7	Maryland	4,674,884	2.1	7	Colorado	4,686,081
8	Iowa	4,618,842	2.1	8	Indiana	3,994,918
9	Colorado	4,076,347	1.8	9	Kansas	3,703,014
10	Kentucky	3,867,908	1.8	10	Wyoming	3,664,190
11	Kansas	3,406,555	1.5	11	Maryland	3,532,257
12	Tennessee	3,022,896	1.4	12	Washington	3,352,798
13	Wyoming	2,863,812	1.3	13	Kentucky	3,064,551
14	Missouri	2,688,321	1.2	14	Missouri	2,871,296
15	Washington	1,884,571		15	Tennessee	2,337,512
16	Virginia	1,815,274		16	Montana	2,324,207
17	Montana	1,479,803		17	Indian Territory	1,827,638
18	Indian Territory	1,381,466		18	New Mexico	1,344,750
19	Arkansas	1,205,479		19	Arkansas	1,238,778
20	New Mexico	992,288		20	Texas	1,139,763
21	Texas	686,734	5.0	21	Virginia	1,070,417
22	Utah	583,709		22	Utah	752,252
23	Michigan	315,722		23	Michigan	462,711
24	Georgia	a 255,682		24	California	b 405,915
25	California	b 160,288		25	Georgia	a 212,537
26	North Dakota	83,895		26	Oregon	212,184
27	Oregon	58,184		27	North Dakota	93,591
28	Idaho	1,039		28	Idaho	2,675
	Total	219,974,667	100.0		Total	208,000,850
						100.0

a Includes North Carolina.

b Includes Alaska.

Rank of coal-producing States in 1899, with amount and value of product, and percentage of each.

1899.							
Production.				Value.			
Rank.	State or Territory.	Amount.	Per cent of total product.	Rank.	State or Territory.	Value.	Per cent of total value.
	Pennsylvania:	Short tons.			Pennsylvania:		
1	Anthracite	60,418,205	23.8	1	Anthracite	\$88,142,130	34.4
	Bituminous	74,150,175	29.2		Bituminous	56,247,791	22.0
2	Illinois	24,439,019	9.7	2	Illinois	20,744,553	8.1
3	West Virginia	19,252,995	7.6	3	Ohio	14,361,903	5.6
4	Ohio	16,500,270	6.5	4	West Virginia	12,053,268	4.7
5	Alabama	7,593,416	3.0	5	Alabama	8,256,462	3.2
6	Indiana	6,006,523	2.4	6	Iowa	6,397,338	2.5
7	Iowa	5,177,479	2.1	7	Colorado	5,363,667	2.1
8	Maryland	4,807,396	1.9	8	Indiana	5,285,018	2.1
9	Colorado	4,776,224	1.9	9	Wyoming	4,742,525	1.9
10	Kentucky	4,607,255	1.8	10	Kansas	4,478,112	1.8
11	Kansas	3,852,267	1.5	11	Maryland	3,667,056	1.4
12	Wyoming	3,837,392	1.5	12	Kentucky	3,618,222	1.4
13	Tennessee	3,330,659	1.3	13	Washington	3,603,989	1.4
14	Missouri	3,025,814	1.2	14	Missouri	3,591,945	1.4
15	Virginia	2,105,791	0.8	15	Tennessee	2,940,644	1.1
16	Washington	2,029,881	0.8	16	Montana	2,347,757	0.9
17	Indian Territory	1,537,427		17	Indian Territory	2,199,785	0.9
18	Montana	1,496,451		18	New Mexico	1,461,865	
19	New Mexico	1,050,714		19	Texas	1,334,895	
20	Texas	883,832		20	Virginia	1,304,241	
21	Arkansas	843,554		21	Utah	997,271	
22	Utah	786,049		22	Arkansas	989,383	
23	Michigan	624,708	3.0	23	Michigan	870,152	3.1
24	Georgia	a 260,007		24	California	b 430,636	
25	California	b 160,972		25	Georgia	a 268,309	
26	North Dakota	98,809		26	Oregon	260,917	
27	Oregon	86,888		27	North Dakota	117,500	
28	Idaho	20		28	Idaho	100	
Total		253,739,992	100.0	Total		256,077,434	100.0

a Includes North Carolina.

b Includes Alaska.

LABOR STATISTICS.

The following table shows under one head the total number of employees in the coal mines of the United States for a period of ten years, and the average time made by each:

Statistics of labor employed in coal mines of the United States since 1890.

State or Territory.	1890.		1891.		1892.	
	Num- ber of days active.	Average number em- ployed.	Num- ber of days active.	Average number em- ployed.	Num- ber of days active.	Average number em- ployed.
Alabama	217	10,642	268	9,302	271	10,075
Arkansas	214	938	214	1,317	199	1,128
California	301	364	222	256	204	187
Colorado	220	5,827	.....	6,000	229	5,747
Georgia	313	425	312	850	277	467
Illinois	204	28,574	215½	32,951	219½	34,585
Indiana	220	5,489	190	5,879	224	6,436
Indian Territory	238	2,571	221½	2,891	311	3,257
Iowa	213	8,130	224	8,124	236	8,170
Kansas	210	4,523	222	6,201	208½	6,559
Kentucky	219	5,259	225	6,355	217	6,724
Maryland	244	3,842	244	3,891	225	3,886
Michigan	229	180	205	223	195	230
Missouri	229	5,971	218	6,199	230	5,893
Montana	218	1,251	.....	1,119	258	1,158
Nevada .....	.....	.....	.....	.....	.....	.....
New Mexico	192	827	265	806	223	1,083
North Carolina	200	80	254	80	160	90
North Dakota .....	.....	.....	.....	.....	216	54
Ohio	201	20,576	206	22,182	212	22,576
Oregon	305	208	125	100	120	90
Pennsylvania bitumi- nous	232	61,333	223	63,661	223	66,655
Tennessee	263	5,082	230	5,097	240	4,926
Texas	241	674	225	787	208	871
Utah	289	429	.....	621	230	646
Virginia	296	1,295	246	820	192	836
Washington	270	2,206	211	2,447	247	2,564
West Virginia	227	12,236	237	14,227	228	14,867
Wyoming	246	3,272	.....	3,411	225	3,133
Total	226	192,204	223	205,803	219	212,893
Pennsylvania anthra- cite	200	126,000	203	126,350	198	129,050
Grand total	216	318,204	215	332,153	212	341,943

^a General average obtained from the average days made in the different States, exclusive of Colorado, Montana, Utah, and Wyoming.

Statistics of labor employed in coal mines of the United States since 1890—Continued.

State or Territory.	1893.		1894.		1895.	
	Num- ber of days active.	Average number em- ployed.	Num- ber of days active.	Average number em- ployed.	Num- ber of days active.	Average number em- ployed.
Alabama	237	11, 294	238	10, 859	244	10, 346
Arkansas	151	1, 559	134	1, 493	176	1, 218
California	208	158	232	125	262	190
Colorado	188	7, 202	155	6, 507	182	6, 125
Georgia	342	736	304	729	312	848
Illinois	229	35, 390	183	38, 477	182	38, 630
Indiana	201	7, 644	149	8, 603	189	8, 530
Indian Territory	171	3, 446	157	3, 101	164	3, 212
Iowa	204	8, 863	170	9, 995	189	10, 066
Kansas	147	7, 310	164	7, 339	159	7, 482
Kentucky	202	6, 581	145	8, 083	146	7, 865
Maryland	240	3, 935	215	3, 974	248	3, 912
Michigan	154	162	224	223	186	320
Missouri	206	7, 375	138	7, 523	163	6, 299
Montana	242	1, 401	192	1, 782	223	2, 184
Nevada			60	2		
New Mexico	229	1, 011	182	985	190	1, 383
North Carolina	80	70	145	95	226	61
North Dakota	193	88	156	77	139	65
Ohio	188	23, 931	136	27, 105	176	24, 644
Oregon	192	110	243	88	69	414
Pennsylvania bitumi- nous	190	71, 931	165	75, 010	206	71, 130
Tennessee	232	4, 976	210	5, 542	224	5, 120
Texas	251	996	283	1, 062	171	1, 642
Utah	226	576	199	671	203	670
Virginia	253	961	234	1, 635	225	2, 158
Washington	241	2, 757	207	2, 662	224	2, 840
West Virginia	219	16, 524	186	17, 824	195	19, 159
Wyoming	189	3, 378	190	3, 032	184	3, 449
Total	204	230, 365	171	244, 603	194	239, 962
Pennsylvania anthra- cite	197	132, 944	190	131, 603	196	142, 917
Grand total	201	363, 309	178	376, 206	195	382, 879

Statistics of labor employed in coal mines of the United States since 1890—Continued.

State or Territory.	1896.		1897.		1898.		1899.	
	Number of days active.	Average number employed.	Number of days active.	Average number employed.	Number of days active.	Average number employed.	Number of days active.	Average number employed.
Alabama	248	9,894	233	10,597	250	10,733	238	13,481
Arkansas	168	1,507	161	1,990	163	2,555	156	2,313
California	<i>a</i> 291	177	<i>a</i> 156	381	<i>a</i> 265	284	<i>a</i> 287	369
Colorado	172	6,704	180	5,852	220	6,440	246	7,166
Georgia	<i>b</i> 301	731	<i>b</i> 296	520	<i>b</i> 292	534	<i>b</i> 291	637
Idaho			<i>c</i> 91	7	157	7		
Illinois	184	39,560	185	33,788	175	35,026	228	36,756
Indiana	163	8,806	176	8,886	199	8,971	218	9,712
Indian Territory	170	3,549	176	3,168	198	3,216	212	4,084
Iowa	178	9,672	201	10,703	219	10,262	229	10,971
Kansas	168	7,127	194	6,639	194	7,197	226	8,000
Kentucky	165	7,549	178	7,983	187	7,614	224	7,461
Maryland	204	4,039	262	4,719	253	4,818	275	4,624
Michigan	157	320	230	537	245	715	232	1,291
Missouri	168	5,982	191	6,414	198	6,542	212	7,136
Montana	234	2,335	252	2,337	216	2,359	238	2,378
Nevada								
New Mexico	172	1,569	208	1,659	242	1,873	257	1,750
North Carolina								
North Dakota	166	141	168	170	187	151	154	210
Ohio	161	25,500	148	26,410	169	26,986	200	26,038
Oregon	191	254	171	254	142	199	238	124
Pennsylvania bituminous	206	72,625	205	77,272	229	79,611	245	82,812
Tennessee	211	6,531	221	6,337	234	6,643	252	6,949
Texas	187	1,953	220	1,766	245	2,130	256	2,410
Utah	202	679	204	704	243	739	265	743
Virginia	198	2,510	213	2,344	230	1,855	252	1,960
Washington	221	2,622	236	2,739	270	3,145	259	3,330
West Virginia	201	19,078	205	20,504	218	21,607	242	23,625
Wyoming	<i>c</i> 210	2,937	219	3,137	242	3,475	261	4,697
Total	192	244,171	196	247,817	211	255,717	234	271,027
Pennsylvania anthracite	174	148,991	150	149,884	152	145,504	173	139,608
Grand total.	185	393,162	179	397,701	190	401,221	214	410,635

a Includes Alaska.

b Includes North Carolina.

c Includes Nebraska.

PRICES.

The following table will be of interest as showing the fluctuations in the average prices ruling in each State since 1886. Prior to that year the statistics were not collected with sufficient accuracy to make a statement of the average prices of any practical value. These averages are obtained by dividing the total value by the total product, except for the years 1886, 1887, and 1888, when the item of colliery consumption was not considered.

Average prices for coal at the mines since 1886.

[Per short ton.]

State or Territory.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Alabama	\$1.43	\$1.30	\$1.15	\$1.11	\$1.03	\$1.07	\$1.05
Arkansas	1.60	1.68	1.50	1.42	1.29	1.19	1.24
California	3.00	3.00	4.00	2.36	2.56	2.20	2.46
Colorado	2.35	2.20	2.20	1.51	1.40	1.37	1.62
Georgia	1.50	1.50	1.50	1.50	1.04	1.50	.99
Illinois	1.11	1.09	1.12	.97	.93	.91	.91
Indiana	1.15	1.34	1.40	1.02	.99	1.03	1.08
Indian Territory	1.60	1.87	1.88	1.76	1.82	1.74	1.71
Iowa	1.25	1.34	1.30	1.33	1.24	1.27	1.32
Kansas	1.20	1.40	1.50	1.48	1.30	1.31	1.31½
Kentucky	1.15	1.15	1.20	.99	.92	.93	.92
Maryland .....	.95	.95	.95	.86	.86	.81	.89
Michigan	1.50	1.50	1.66	1.71	1.99	1.66	1.56
Missouri	1.30	1.34	2.21	1.36	1.24	1.23	1.23
Montana	3.50	3.50	3.50	2.42	2.42	2.27	2.36
New Mexico	3.00	3.00	3.00	1.79	1.34	1.68	1.62
North Carolina					1.74	1.93	1.44
North Dakota	1.59	1.50	3.50	1.43	1.40	1.40	.96
Ohio .....	.95	.88	.93	.93	.94	.94	.94
Oregon	2.50	2.20	3.00		2.89	3.00	4.29
Pennsylvania bituminous .....	.80	.90	.95	.77	.84	.87	.84
Tennessee	1.15	1.30	1.10	1.21	1.10	1.11	1.13
Texas	1.85	2.00	2.05	2.66	2.53	2.40	2.32
Utah	2.10	2.00	2.10	1.59	1.74	1.80	1.56
Virginia	1.00	.94	1.00	.93	.75	.83	.86
Washington	2.25	2.20	3.00	2.32	2.71	2.31	2.28
West Virginia .....	.94	.95	1.10	.82	.84	.80	.80
Wyoming	3.00	3.00	3.00	1.26	1.70	1.53	1.27
Total bituminous	a1.06	a1.12	a1.00	1.00	.99	.99	.99
Pennsylvania anthracite	a1.95	a2.01	a1.95	1.44	1.43	1.46	1.57
General average	a1.30	a1.45	a1.42	1.13	1.12	1.13	1.16

a Exclusive of colliery consumption.

COAL.

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Average prices for coal at the mines since 1886—Continued.

[Per short ton.]

State or Territory.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Alabama	\$0.99	\$0.93	\$0.90	\$0.90	\$0.88	\$0.75	\$1.09
Arkansas	1.34	1.22	1.25	1.11	1.06	1.03	1.17
California	2.31	2.31	2.33	<i>a</i> 2.35	<i>a</i> 2.55	<i>a</i> 2.53	<i>a</i> 2.68
Colorado	1.24	1.24	1.20	1.16	1.17	1.15	1.12
Georgia .....	.98	.85	.83	.70	.72	.81	1.00
Idaho					<i>b</i> 3.33	2.57	5.00
Illinois .....	.89	.89	.80	.80	.72	.78	.85
Indiana	1.07	.96	.91	.84	.84	.81	.88
Indian Territory	1.79	1.59	1.43	1.40	1.34	1.32	1.43
Iowa	1.30	1.26	1.20	1.17	1.13	1.14	1.24
Kansas	1.27	1.23	1.20	1.15	1.18	1.09	1.16
Kentucky .....	.86	.88	.86	.78	.79	.79	.79
Maryland .....	.88	.77	.81	.80	.76	.76	.76
Michigan	1.79	1.47	1.60	1.62	1.46	1.47	1.39
Missouri	1.23	1.17	1.12	1.08	1.08	1.07	1.20
Montana	1.99	2.04	1.89	1.47	1.76	1.57	1.57
Nevada		3.15					
New Mexico	1.47	1.57	1.49	1.49	1.38	1.35	1.39
North Carolina	1.50	1.76	1.66	1.50	1.34	1.25	1.30
North Dakota	1.13	1.12	1.07	1.09	1.08	1.11	1.19
Ohio .....	.92	.83	.79	.79	.78	.83	.87
Oregon	3.57	3.87	3.36	2.90	3.09	3.65	3.00
Pennsylvania bituminous ..	.80	.74	.72	.71	.69	.67	.76
Tennessee	1.08	.97	.93	.86	.81	.77	.88
Texas	2.28	2.32	1.88	1.65	1.52	1.66	1.51
Utah	1.48	1.40	1.31	1.20	1.19	1.27	1.27
Virginia .....	.84	.76	.63	.68	.67	.59	.62
Washington	2.31	2.33	2.16	2.00	1.94	1.78	1.78
West Virginia .....	.77	.75	.68	.65	.63	.61	.63
Wyoming	1.35	1.31	1.33	<i>b</i> 1.37	1.21	1.28	1.24
Total bituminous .....	.96	.91	.86	.83	.81	.80	.87
Pennsylvania anthracite ..	1.59	1.52	1.41	1.50	1.51	1.41	1.46
General average	1.14	1.09	1.02	1.02	.99	.95	1.01

a Includes Alaska.*b* Includes Nebraska.

IMPORTS AND EXPORTS.

The following tables have been compiled from official returns to the Bureau of Statistics of the Treasury Department, and show the imports and exports of coal from 1867 to 1899, inclusive. The values given in both cases are considerably higher than the average "spot" rates by which the values of the domestic production have been computed.

The tariff from 1824 to 1843 was 6 cents per bushel, or \$1.68 per long ton; from 1843 to 1846, \$1.75 per ton; 1846 to 1857, 30 per cent ad valorem; 1857 to 1861, 24 per cent ad valorem; 1861, bituminous and shale, \$1 per ton; all other, 50 cents per ton; 1862 to 1864, bituminous and shale, \$1.10 per ton; all other, 60 cents per ton; 1864 to 1872, bituminous and shale, \$1.25 per ton; all other, 40 cents per ton. By the act of 1872 the tariff on bituminous coal and shale was made 75 cents per ton, and so continued until the act of August, 1894, changed it to 40 cents per ton. On slack or culm the tariff was made 40 cents per ton by the act of 1872; was changed to 30 cents per ton by the act of March, 1883, and so continued until the act of August, 1894, changed it to 15 cents per ton. The tariff act of 1897 provides that all coals containing less than 92 per cent fixed carbon, and which will pass over a half-inch screen, shall pay a duty of 67 cents per ton. Slack or culm was not changed by the act of 1897. Tons are all 2,240 pounds. Anthracite coal has been free of duty since 1870. During the period from June, 1854, to March, 1866, the reciprocity treaty was in force, and coal from the British possessions in North America was admitted into the United States duty free.

The exports consist both of anthracite and bituminous coal, the amount of bituminous being the greater in the last few years. They are made principally by rail over the international bridges and by lake and sea to the Canadian provinces. Exports are also made by sea to the West Indies, to Central and South America, and elsewhere.

The imports are principally from Australia and British Columbia to San Francisco, from Great Britain to the Atlantic and Pacific coasts, and from Nova Scotia to Atlantic coast points.

Coal imported and entered for consumption in the United States, 1867 to 1899.

Year ending—	Anthracite.		Bituminous and shale.	
	Quantity.	Value.	Quantity.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
June 30, 1867.....			509,802	\$1,412,597
1868.....			394,021	1,250,513
1869.....			437,228	1,222,119
1870.....			415,729	1,103,965
1871.....	973	\$4,177	430,508	1,121,914
1872.....	390	1,322	485,063	1,279,686
1873.....	2,221	10,764	460,028	1,548,208
1874.....	471	3,224	492,063	1,937,274
1875.....	138	963	436,714	1,791,601
1876.....	1,428	8,560	400,632	1,592,846
1877.....	630	2,220	495,816	1,782,941
1878.....	158	518	572,846	1,929,660
1879.....	488	721	486,501	1,716,209
1880.....	8	40	471,818	1,588,312
1881.....	1,207	2,628	652,963	1,988,199
1882.....	36	148	795,722	2,141,373
1883.....	507	1,172	645,924	3,013,555
1884.....	1,448	4,404	748,995	2,494,228
1885.....	4,976	15,848	768,477	2,548,432
Dec. 31, 1886.....	2,039	4,920	811,657	2,501,153
1887.....	14,181	42,983	819,242	2,609,311
1888.....	24,093	68,710	1,085,647	3,728,060
1889.....	20,652	117,434	1,001,374	3,425,347
1890.....	15,145	46,695	819,971	2,822,216
1891.....	37,607	112,722	1,363,313	4,561,105
1892.....	65,058	197,583	1,143,304	3,744,862
1893.....	53,768	148,112	<i>a</i> 1,082,993	3,623,892
1894.....	90,068	234,024	<i>b</i> 1,242,714	3,785,513
1895.....	141,337	328,705	<i>c</i> 1,212,023	3,626,623
1896.....	101,689	237,717	1,211,448	3,453,742
1897.....	24,534	59,222	<i>d</i> 1,276,135	3,424,833
1898.....	3,149	8,609	<i>e</i> 1,277,070	3,569,743
1899.....	47	171	<i>f</i> 1,329,903	3,869,354

a Including 14,632 tons of slack or culm, valued at \$16,906.

b Including 30,453 tons of slack or culm, valued at \$32,267.

c Including 18,174 tons of slack or culm, valued at \$15,309.

d Including 42,954 tons of slack or culm, valued at \$44,962.

e Including 104,555 tons of slack or culm, valued at \$110,545.

f Including 200,938 tons of slack or culm, valued at \$214,770.

MINERAL RESOURCES.

Coal of domestic production exported from the United States, 1867 to 1899.

Year ending—	Anthracite.		Bituminous and shale.	
	Quantity.	Value.	Quantity.	Value.
	<i>Long tons.</i>		<i>Long tons.</i>	
June 30, 1867	192,912	\$1,333,457	92,189	\$512,742
1868	192,291	1,082,745	86,367	433,475
1869	283,783	1,553,115		
1870	121,098	803,135	106,820	503,223
1871	134,571	805,169	133,380	564,067
1872	259,567	1,375,342	141,311	586,264
1873	342,180	1,827,822	242,453	1,086,253
1874	401,912	2,236,084	361,490	1,587,666
1875	316,157	1,791,626	203,189	828,943
1876	337,934	1,869,434	230,144	850,711
1877	418,791	1,891,351	321,665	1,024,711
1878	319,477	1,006,843	340,661	1,352,624
1879	386,916	1,427,886	276,000	891,512
1880	392,626	1,362,901	222,634	695,179
1881	462,208	2,091,928	191,038	739,532
1882	553,742	2,589,887	314,320	1,102,898
1883	557,813	2,648,033	463,051	1,593,214
1884	649,040	3,053,550	646,265	1,977,959
1885	588,461	2,586,421	683,481	1,989,541
Dec. 31, 1886	667,076	2,718,143	544,768	1,440,631
1887	825,486	3,469,166	706,364	2,001,966
1888	969,542	4,325,126	860,462	2,529,472
1889	857,632	3,636,347	935,151	2,783,592
1890	794,335	3,272,697	1,280,930	4,004,995
1891	861,251	3,577,610	1,615,869	5,104,850
1892	851,639	3,722,903	1,645,869	4,999,289
1893	1,333,287	6,241,007	2,324,591	6,009,801
1894	1,440,625	6,359,021	2,195,716	4,970,270
1895	1,470,710	5,937,130	2,211,983	4,816,847
1896	1,350,000	5,925,506	2,276,202	5,072,818
1897	1,298,768	5,836,730	2,399,263	5,326,761
1898	1,350,948	5,712,985	3,152,459	6,699,248
1899	1,707,796	7,140,100	4,044,354	8,573,276

WORLD'S PRODUCT OF COAL.

In the following table is given the coal product of the principal countries for the years nearest the one under review for which figures could be obtained. For the sake of convenience the amounts are expressed in the unit of measurement adopted in each country and reduced for comparison to short tons of 2,000 pounds. In each case the year is named for which the product is given:

The world's production of coal.

Country.	Usual unit in producing country.	Equivalent in short tons.
United States (1899) long tons..	226,553,564	253,739,992
Great Britain (1899) do....	220,085,303	246,495,539
Germany (1899) metric tons..	135,824,427	149,719,766
Austria-Hungary (1898) do....	37,786,963	41,652,569
France (1898) do....	32,356,104	35,656,426
Belgium (1899) do....	21,917,740	24,159,925
Russia (1898) do....	12,862,033	14,173,900
Canada (1899) short tons..	4,925,051	4,925,051
Japan (1897) metric tons..	5,647,751	6,225,516
India (1898) long tons..	4,203,199	4,707,582
New South Wales (1899) do....	4,597,028	5,148,671
Spain (1899) metric tons..	2,742,389	3,022,113
New Zealand (1898) long tons..	906,778	1,015,591
Sweden (1898) metric tons..	236,277	260,448
Italy (1898) do....	341,327	376,245
South African Republic (1898) long tons..	1,907,271	2,136,143
Queensland (1898) do....	407,819	456,757
Victoria (1898) do....	245,659	275,138
Natal (1898) do....	387,811	434,348
Cape Colony (1898) do....	171,301	191,857
Tasmania (1898) do....	44,141	49,138
Other countries (a) do....	2,000,000	2,240,000
Total		797,062,775
Percentage of the United States		32

a Includes China, Turkey, Servia, Portugal, United States of Colombia, Chile, Borneo and Labua Mexico, Peru, Greece. etc.

The preceding table shows that the United States has taken first place among the coal-producing countries of the world. Our product in 1899 exceeded that of Great Britain, our only real competitor, by 5,494,632 long tons. The steps by which the United States has advanced to this position may be seen from the figures presented in the following table, showing the coal production of all the countries of the world since 1868. It is but fair to state that the product given for Great Britain does not include that of any of her colonies. If to the product of Great Britain is added that of Canada, India, New South Wales, New Zealand, etc., the United States would still be in second place. A glance at the succeeding table shows that in 1868 the coal product of Great Britain was 3.6 times that of the United States. In the same year the product of Germany was nearly 15 per cent larger than ours. In 1871 we passed Germany, leading her in that year by about 10 per cent. In 1875 and 1876 the United States fell back to third place, but took second place again in 1877 and continued to gain in comparison with Germany until in 1899 the product of the United States was 69 per cent more than that of her former rival. From 1868 to 1878 the product of the United States had increased from 28,258,000 long tons to 51,655,000 long tons. In the same time Great Britain's product had increased from 103,141,157 long tons to 132,612,063 long tons, so that her tonnage in the latter year was not quite 2.6 times as great as that of the United States. In 1888 the output of the United States had risen to 132,731,613 long tons and that of Great Britain to 169,935,219 long tons, 1.3 times the product of the United States. In 1898 the tonnage of the two countries was, respectively, 196,405,953 and 202,054,516, Great Britain leading the United States by less than 3 per cent. In 1899 the positions held in 1898 were reversed, the United States leading Great Britain by a little less than 3 per cent.

In 1868 the United States contributed 14.35 per cent of the world's coal supply; in 1878, 18.17 per cent; in 1888, 28.52 per cent, and in 1899, 31.83 per cent.

COAL.

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World's production of coal, by countries, since 1868.

Year.	United States.		Great Britain.	
	Long tons.	Short tons.	Long tons.	Short tons.
1868.....	28, 258, 000	31, 648, 960	103, 141, 157	115, 518, 096
1869.....	28, 268, 000	31, 660, 160	107, 427, 557	120, 318, 864
1870.....	32, 863, 000	36, 806, 560	110, 431, 192	123, 682, 935
1871.....	41, 384, 000	46, 350, 080	117, 352, 028	131, 434, 271
1872.....	45, 416, 000	50, 865, 920	123, 497, 316	138, 316, 994
1873.....	51, 004, 000	57, 124, 480	128, 680, 131	144, 121, 747
1874.....	46, 916, 000	52, 545, 920	126, 590, 108	141, 780, 921
1875.....	46, 686, 000	52, 288, 320	133, 306, 485	149, 303, 263
1876.....	47, 500, 000	53, 200, 000	134, 125, 166	150, 220, 186
1877.....	53, 948, 000	60, 421, 760	134, 179, 968	150, 281, 564
1878.....	51, 655, 000	57, 853, 600	132, 612, 063	148, 525, 511
1879.....	59, 333, 000	66, 452, 960	133, 720, 393	149, 766, 840
1880.....	63, 822, 830	71, 481, 569	146, 969, 409	164, 605, 738
1881.....	76, 865, 357	85, 881, 030	154, 184, 300	172, 686, 416
1882.....	92, 219, 454	103, 285, 789	156, 499, 977	175, 279, 974
1883.....	102, 867, 969	115, 212, 125	163, 737, 327	183, 385, 806
1884.....	106, 906, 295	119, 735, 051	160, 757, 779	180, 048, 712
1885.....	99, 069, 216	110, 957, 522	159, 351, 418	178, 473, 588
1886.....	101, 500, 024	113, 680, 027	157, 518, 482	176, 420, 700
1887.....	116, 651, 974	130, 650, 211	162, 118, 812	181, 574, 189
1888.....	132, 731, 613	148, 659, 407	169, 935, 219	190, 327, 445
1889.....	126, 097, 869	141, 229, 613	176, 916, 724	198, 146, 731
1890.....	140, 866, 931	157, 770, 963	181, 614, 288	203, 408, 003
1891.....	150, 505, 954	168, 566, 668	185, 479, 126	207, 736, 621
1892.....	160, 115, 242	179, 329, 071	181, 786, 871	203, 601, 296
1893.....	162, 814, 977	182, 352, 774	164, 325, 795	184, 044, 890
1894.....	152, 447, 791	170, 741, 526	188, 277, 525	210, 870, 828
1895.....	172, 426, 366	193, 117, 530	189, 661, 362	212, 320, 725
1896.....	171, 416, 390	191, 986, 357	195, 361, 260	218, 804, 611
1897.....	178, 769, 344	200, 221, 665	202, 129, 931	226, 385, 523
1898.....	196, 405, 953	219, 974, 667	202, 054, 516	226, 301, 058
1899.....	226, 553, 564	253, 739, 992	220, 085, 303	246, 495, 539

World's production of coal, by countries, since 1868—Continued.

Year.	Germany.		Austria-Hungary.	
	Metric tons.	Short tons.	Metric tons.	Short tons.
1868.....	32,879,123	36,249,233	7,021,756	7,741,486
1869.....	34,343,913	37,864,164	7,663,043	8,448,505
1870.....	34,003,004	37,488,312	8,355,945	9,212,429
1871.....	37,856,110	41,736,361	8,437,401	9,302,235
1872.....	42,324,467	46,662,725	8,825,896	9,730,550
1873.....	46,145,194	50,875,076	10,104,769	11,140,508
1874.....	46,658,145	51,440,605	12,631,364	13,926,079
1875.....	47,804,054	52,703,970	13,062,738	14,395,137
1876.....	49,550,461	54,629,383	13,000,000	14,327,300
1877.....	48,229,882	53,173,445	13,500,000	14,883,750
1878.....	50,519,899	55,698,188	13,900,000	15,324,750
1879.....	53,470,716	58,951,464	14,500,000	15,986,250
1880.....	59,118,035	65,177,634	14,800,000	16,317,000
1881.....	61,540,485	67,848,385	15,304,813	16,873,556
1882.....	65,378,211	72,079,478	15,555,292	17,149,709
1883.....	70,442,648	77,663,019	17,047,981	18,795,377
1884.....	72,113,820	79,505,487	18,000,000	19,845,000
1885.....	73,675,515	81,227,255	20,435,463	22,530,098
1886.....	73,682,584	81,235,049	20,779,441	22,909,334
1887.....	76,232,618	84,046,461	21,879,172	24,121,787
1888.....	81,960,083	90,360,992	23,859,608	26,305,218
1889.....	84,973,230	93,640,500	25,328,417	27,924,580
1890.....	89,290,834	98,398,500	27,504,032	30,323,195
1891.....	94,252,278	103,913,136	28,823,240	31,777,622
1892.....	92,544,050	102,029,815	29,037,978	32,014,371
1893.....	95,426,153	105,207,334	30,449,304	33,570,358
1894.....	98,805,702	108,883,884	31,492,000	34,704,184
1895.....	103,957,639	114,561,318	32,654,777	35,985,564
1896.....	112,471,106	123,943,159	33,676,411	37,111,405
1897.....	120,474,485	132,762,882	35,858,000	39,515,516
1898.....	130,928,490	144,283,196	37,786,963	41,652,569
1899.....	135,824,427	149,719,766	.....	(a)

a Latest available figures are used in making up totals.

World's production of coal, by countries, since 1868—Continued.

Year.	France.		Belgium.	
	Metric tons.	Short tons.	Metric tons.	Short tons.
1868.....	13,330,826	14,697,236	12,298,589	13,559,194
1869.....	13,509,745	14,894,494	12,943,994	14,270,753
1870.....	13,179,788	14,530,716	13,697,118	15,101,073
1871.....	13,240,135	14,597,249	13,733,176	15,140,827
1872.....	16,100,773	17,751,102	15,658,948	17,263,990
1873.....	17,479,341	19,270,973	15,778,401	17,395,687
1874.....	16,907,913	18,640,974	14,669,029	16,172,604
1875.....	16,956,840	18,694,916	15,011,331	16,549,992
1876.....	17,101,448	18,854,346	14,329,578	15,798,360
1877.....	16,804,529	18,526,993	13,669,077	15,070,157
1878.....	16,960,916	18,699,410	14,899,175	16,426,340
1879.....	17,110,979	18,864,854	15,447,292	17,030,640
1880.....	19,361,564	21,346,124	16,886,698	18,617,585
1881.....	19,765,983	21,791,996	16,873,951	18,603,531
1882.....	20,603,704	22,715,584	17,590,989	19,394,065
1883.....	21,333,884	23,520,607	18,177,754	20,040,974
1884.....	20,023,514	22,075,924	18,051,499	19,901,778
1885.....	19,510,530	21,510,359	17,437,603	19,224,957
1886.....	19,909,894	21,950,658	17,285,543	19,057,311
1887.....	21,287,589	23,469,567	18,378,624	20,262,433
1888.....	22,602,894	24,919,691	19,218,481	21,188,375
1889.....	24,303,509	26,794,619	19,869,980	21,906,653
1890.....	26,083,118	28,756,638	20,365,960	22,453,471
1891.....	26,024,893	28,692,444	19,675,644	21,692,398
1892.....	26,178,701	28,862,018	19,583,173	21,590,448
1893.....	25,650,981	28,280,207	19,410,519	21,400,097
1894.....	27,459,137	30,273,699	20,458,827	22,555,857
1895.....	28,019,893	30,877,922	20,450,604	22,536,566
1896.....	29,189,900	32,167,270	21,252,370	23,420,112
1897.....	30,797,629	33,938,987	21,534,629	23,731,161
1898.....	32,356,104	35,656,426	22,075,093	24,326,752
1899.....		(a)	21,917,740	24,159,925

^a Latest available figures are used in making up totals.

MINERAL RESOURCES.

World's production of coal, by countries, since 1868—Continued.

Year.	Russia.		Japan.	
	Metric tons.	Short tons.	Metric tons.	Short tons.
1868.....				
1869.....				
1870.....	696, 673	768, 082		
1871.....				
1872.....				
1873.....				
1874.....				
1875.....	1, 709, 718	1, 884, 964		
1876.....				
1877.....				
1878.....	2, 483, 575	2, 738, 141		
1879.....	2, 874, 790	3, 169, 456		
1880.....	3, 238, 470	3, 570, 413		
1881.....	3, 439, 787	3, 792, 365		
1882.....	3, 672, 782	4, 049, 242		
1883.....	3, 916, 105	4, 317, 506	1, 021, 000	1, 125, 142
1884.....	3, 869, 689	4, 266, 332	1, 159, 000	1, 277, 218
1885.....	4, 207, 905	4, 639, 215	1, 314, 000	1, 448, 028
1886.....	4, 506, 027	4, 967, 895	1, 402, 000	1, 545, 004
1887.....	4, 464, 174	4, 921, 752	1, 785, 000	1, 967, 070
1888.....	5, 187, 312	5, 719, 011	2, 044, 000	2, 252, 488
1889.....	6, 215, 577	6, 852, 674	2, 435, 000	2, 683, 370
1890.....	6, 016, 525	6, 633, 219	2, 653, 000	2, 923, 606
1891.....	6, 233, 020	6, 871, 905	3, 230, 000	3, 559, 460
1892.....	6, 816, 323	7, 514, 996	3, 228, 000	3, 557, 256
1893.....	7, 535, 000	8, 307, 337	3, 350, 000	3, 691, 700
1894.....	8, 629, 000	9, 509, 158	4, 311, 000	4, 750, 722
1895.....	9, 079, 138	10, 005, 210	4, 849, 000	5, 343, 598
1896.....	9, 229, 000	10, 170, 358	5, 019, 690	5, 531, 698
1897.....	11, 207, 475	12, 350, 638	5, 647, 751	6, 225, 516
1898.....	12, 862, 033	14, 173, 960		(a)
1899.....		(a)		(a)

a Latest available figures are used in making up totals.

World's production of coal, by countries, since 1868—Continued.

Year.	Other countries.	Total.	Per cent of United States.
	Short tons.	Short tons.	
1868.....	1, 147, 330	220, 561, 535	14. 35
1869.....	1, 104, 563	228, 561, 503	13. 85
1870.....	1, 063, 121	238, 653, 228	15. 42
1871.....	1, 114, 248	259, 675, 271	17. 85
1872.....	1, 268, 115	281, 859, 396	18. 05
1873.....	1, 502, 516	301, 430, 987	18. 95
1874.....	2, 708, 756	297, 215, 859	17. 68
1875.....	2, 639, 104	308, 459, 666	16. 95
1876.....	2, 597, 143	309, 626, 718	17. 18
1877.....	2, 821, 155	315, 178, 824	19. 17
1878.....	3, 176, 050	318, 441, 960	18. 17
1879.....	3, 362, 605	333, 585, 069	19. 92
1880.....	3, 621, 342	364, 737, 405	19. 60
1881.....	5, 185, 974	392, 663, 253	21. 87
1882.....	6, 128, 631	420, 082, 472	24. 58
1883.....	6, 929, 841	450, 990, 397	25. 55
1884.....	7, 367, 309	454, 022, 811	26. 37
1885.....	7, 570, 507	447, 581, 529	24. 79
1886.....	9, 082, 815	450, 848, 791	25. 22
1887.....	<i>a</i> 10, 399, 273	481, 362, 743	27. 14
1888.....	11, 493, 176	521, 225, 803	28. 52
1889.....	12, 618, 299	531, 797, 039	26. 56
1890.....	13, 025, 637	563, 693, 232	27. 99
1891.....	14, 744, 329	587, 554, 583	28. 69
1892.....	14, 998, 633	593, 497, 904	30. 22
1893.....	15, 783, 599	582, 638, 296	31. 30
1894.....	<i>b</i> 18, 197, 510	610, 487, 368	27. 97
1895.....	<i>c</i> 19, 428, 643	644, 177, 076	29. 98
1896.....	<i>d</i> 20, 866, 748	664, 001, 718	28. 92
1897.....	<i>e</i> 22, 074, 093	696, 512, 163	28. 75
1898.....	<i>f</i> 24, 797, 873	<i>f</i> 737, 392, 017	29. 90
1899.....	<i>g</i> 25, 239, 082	<i>g</i> 797, 062, 775	31. 83

a From 1887 to 1893, inclusive, the total includes, in addition to the countries named on the following pages, the estimated output of countries not specified. The amounts added for this factor each year are as follows: 1887, 500,000 tons; 1888, 700,000 tons; 1889, 900,000 tons; 1890, 1,000,000 tons; 1891, 1,000,000 tons; 1892, 1,400,000 tons; 1893, 1,500,000 tons.

b This includes, in addition to the countries named on the following pages, the output of Natal, 169,702 tons; Cape Colony, 78,058 tons; Tasmania, 34,633 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,522,388 tons.

c This includes, in addition to the countries named on the following pages, the output of Natal, 172,425 tons; Cape Colony, 98,543 tons; Tasmania, 41,279 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,552,247 tons.

d This includes, in addition to the countries named on the following pages, the output of Natal, 241,920 tons; Cape Colony, 117,969 tons; Tasmania, 40,615 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,640,504 tons.

e This includes, in addition to the countries named on the following pages, the output of Natal, 273,235 tons; Cape Colony, 127,513 tons; Tasmania, 52,275 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,693,023 tons.

f This includes, in addition to the countries named on the following pages, the output of Natal, 434,348 tons; Cape Colony, 191,857 tons; Tasmania, 49,138 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,915,343 tons.

g Latest available figures are used in making up total.

Product of minor coal-producing countries since 1868.

Year.	New South Wales.		Queensland.	
	Long tons.	Short tons.	Long tons.	Short tons.
1868.....	954,231	1,068,739	19,611	21,964
1869.....	919,774	1,030,147	11,120	12,454
1870.....	868,564	972,791	22,639	25,356
1871.....	898,784	1,006,638	17,000	19,040
1872.....	1,012,426	1,133,917	27,727	31,054
1873.....	1,192,862	1,336,005	33,613	37,647
1874.....	1,304,567	1,461,115	43,443	48,656
1875.....	1,329,729	1,489,296	32,107	35,960
1876.....	1,319,918	1,478,308	50,627	56,702
1877.....	1,444,271	1,617,584	60,918	68,228
1878.....	1,575,497	1,764,556	52,580	58,890
1879.....	1,583,381	1,773,387	55,012	61,613
1880.....	1,466,180	1,642,122	58,052	65,018
1881.....	1,769,597	1,981,949	65,612	73,485
1882.....	2,109,282	2,362,396	74,436	83,368
1883.....	2,521,457	2,824,032	104,750	117,320
1884.....	2,749,109	3,079,002	120,727	135,214
1885.....	2,878,863	3,224,327	209,698	234,862
1886.....	2,830,175	3,169,796	228,656	256,094
1887.....	2,922,497	3,273,197	238,813	267,470
1888.....	3,203,444	3,587,857	311,412	348,781
1889.....	3,655,632	4,094,308	265,507	297,368
1890.....	3,060,876	3,428,181	338,344	378,945
1891.....	4,037,929	4,522,480	271,603	304,195
1892.....	3,780,968	4,234,684	265,086	296,896
1893.....	3,278,328	3,671,727	264,403	296,131
1894.....	3,672,076	4,112,725	270,705	303,190
1895.....	3,737,536	4,186,040	322,977	361,734
1896.....	3,909,517	4,378,659	371,000	415,520
1897.....	4,383,591	4,909,622	358,407	401,416
1898.....	4,736,000	5,304,320	407,819	456,757
1899.....	4,597,028	5,148,671	.....	(a)

a Latest available figures are used in making up totals.

Product of minor coal-producing countries since 1868—Continued.

Year.	New Zealand.		Victoria.		Canada.
	Long tons.	Short tons.	Long tons.	Short tons.	Short tons.
1868.....					
1869.....					
1870.....					
1871.....					
1872.....					
1873.....					
1874.....					1,058,446
1875.....					984,905
1876.....					933,803
1877.....					1,002,395
1878.....	162,218	181,684			1,034,081
1879.....	231,218	258,964			1,123,863
1880.....	299,923	335,913			1,424,635
1881.....	337,262	377,733			1,487,182
1882.....	378,272	423,665			1,811,708
1883.....	421,764	472,376			1,806,259
1884.....	480,831	538,531			1,950,080
1885.....	511,063	572,390			1,879,470
1886.....	534,353	598,475			2,091,976
1887.....	558,620	625,654			2,418,494
1888.....	613,895	687,562			2,658,134
1889.....	586,445	656,818	14,421	16,152	2,719,478
1890.....	637,397	713,885	20,750	23,240	3,117,661
1891.....	668,794	749,049	22,834	25,574	3,623,076
1892.....	673,315	754,113	23,363	26,166	3,292,547
1893.....	691,548	774,534	91,726	102,733	3,201,742
1894.....	719,546	805,892	175,175	196,196	3,903,913
1895.....	727,000	814,240	194,171	217,472	3,512,504
1896.....	793,000	888,160	227,000	255,240	3,743,234
1897.....	840,713	941,600	236,277	264,630	3,786,107
1898.....	906,778	1,015,591	245,659	275,138	4,172,655
1899.....		(a)		(a)	4,925,051

a Latest available figures are used in making up totals.

Product of minor coal-producing countries since 1868—Continued.

Year.	India.		Spain.	
	Long tons.	Short tons.	Metric tons.	Short tons.
1868.....				
1869.....				
1870.....				
1871.....				
1872.....				
1873.....				
1874.....				
1875.....				
1876.....				
1877.....				
1878.....				
1879.....				
1880.....				
1881.....	997, 543	1, 117, 248		
1882.....	1, 130, 242	1, 265, 871		
1883.....	1, 315, 976	1, 473, 893		
1884.....	1, 266, 312	1, 418, 269		
1885.....	1, 294, 221	1, 449, 528		
1886.....	1, 401, 295	1, 569, 450	1, 001, 432	1, 104, 079
1887.....	1, 560, 393	1, 747, 640	1, 038, 305	1, 144, 731
1888.....	1, 802, 876	2, 019, 221	1, 036, 565	1, 142, 813
1889.....	2, 045, 359	2, 290, 802	1, 153, 755	1, 272, 015
1890.....	2, 168, 521	2, 438, 744	1, 212, 089	1, 336, 328
1891.....	2, 328, 577	2, 608, 006	1, 287, 988	1, 420, 007
1892.....	2, 537, 696	2, 842, 220	1, 461, 196	1, 610, 969
1893.....	2, 529, 855	2, 833, 438	1, 484, 794	1, 636, 986
1894.....	2, 810, 929	3, 158, 240	1, 657, 010	1, 830, 853
1895.....	3, 538, 000	3, 962, 560	1, 783, 783	1, 965, 729
1896.....	3, 848, 000	4, 309, 760	1, 878, 399	2, 069, 996
1897.....	4, 063, 127	4, 550, 702	1, 939, 400	2, 137, 219
1898.....	4, 203, 199	4, 707, 582	2, 526, 600	2, 784, 313
1899.....		(a)	2, 742, 389	3, 022, 113

a Latest available figures are used in making up totals.

Product of minor coal-producing countries since 1868—Continued.

Year.	Italy.		Sweden.		South African Republic.	
	Metric tons.	Short tons.	Metric tons.	Short tons.	Long tons.	Short tons.
1868.....	51,386	56,627				
1869.....	56,201	61,962				
1870.....	58,770	64,794				
1871.....	80,336	88,570				
1872.....	93,555	103,144				
1873.....	116,884	128,864				
1874.....	127,473	140,539				
1875.....	116,955	128,943				
1876.....	116,399	128,330				
1877.....	120,588	132,948				
1878.....	124,117	136,839				
1879.....	131,318	144,778				
1880.....	139,369	153,654				
1881.....	134,582	148,377				
1882.....	164,737	181,623				
1883.....	214,121	235,961				
1884.....	223,322	246,213				
1885.....	190,413	209,930				
1886.....	243,325	268,266				
1887.....	327,665	361,251				
1888.....	366,794	404,390				
1889.....	390,320	432,533				
1890.....	376,326	415,500	187,512	206,132		
1891.....	289,286	318,938	198,033	218,331		
1892.....	295,713	326,024	199,380	219,816		
1893.....	317,249	349,767	199,933	220,426	548,534	614,358
1894.....	271,395	299,103	213,633	235,532	791,358	886,321
1895.....	305,321	336,563	223,652	246,464	1,133,466	1,269,482
1896.....	276,197	304,369	226,000	249,052	1,437,297	1,609,772
1897.....	314,222	346,273	224,343	251,264	1,600,212	1,792,237
1898.....	341,327	376,245	236,277	260,448	1,907,271	2,136,143
1899.....		(a)		(a)		(a)

a Latest available figures are used in making up totals.

COAL MINED BY MACHINES IN 1899.

The increase in the use of undercutting machines in the bituminous coal mines of the United States continues to be one of the most interesting features of the industry. The statistics relating to the machine-mined tonnage have been collected for 1899 as for the three preceding years, and results are presented in the accompanying table. The statement shows that the amount of coal produced by machines in 1899 was 43,963,933 short tons, an increase, as compared with 1898, of 11,550,789 tons. The increase in 1898 over 1897 was 9,763,924 short tons, while the increase from 1896 to 1897 was 6,224,288 short tons. In collecting the statistics of machine mining for 1896 the inquiries were made to cover also the year 1891. The results obtained show that in 1891 the total product by machines was 6,211,732 short tons, nearly half of which was in Illinois, while Ohio made up another fourth. In 1896 the machine-mined product had increased to 16,424,932, a gain in five years of more than a million tons less than the gain each year from 1897 to 1899.

There were 22 States and Territories in which machines were used in 1899. Two States and one Territory in which a machine-mined tonnage was reported in one or more of the preceding years did not report any machines used in 1899. These were Alaska, Texas, and Utah. Maryland introduced machines for the first time in 1899, two companies installing a total of 8 air-driven pick machines, and having a product from them of 16,545 short tons. Washington, which did not report any machines in use in 1897 and 1898, is added again to the list of States using machines in 1899. The total number of States having machines in use last year was 22, against 21 in 1898, 20 in 1897, and 16 in 1896. The number of firms employing machines has increased from 136 in 1896 to 335 in 1899, while the number of machines in use has increased in the same time from 1,446 to 3,125. In the same period the total bituminous coal product of the United States has increased from 137,640,276 short tons to 193,321,987 short tons, a gain of 55,681,711 tons, or 40 per cent. The total product in the States having machines in use has increased from 115,921,828 short tons to 191,144,218 short tons, a gain of 75,222,390 tons, or 65 per cent, while the machine-mined product has increased from 16,424,932 short tons to 43,963,933 short tons, a gain of 27,539,102 tons, or 168 per cent.

Considering the statistics by States, it is seen that there were 4 States in which the machine-won product in 1899 was less than in 1898. These States were Alabama, Arkansas, Iowa, and North Dakota. Satisfactory explanation for this decrease is not given except in Arkansas, where some of the large mines using machines were idle because of strikes a good part of the year. New Mexico reported a decrease from 29 to 15 in the number of machines in use, but a substantial increase

in the tonnage. Pennsylvania is credited with the largest increase, 258 machines and 5,488,242 tons being added to the figures for 1898. Illinois comes second in the increase of tonnage, adding 2,669,677 tons to the machine-mined product of 1898. Prior to 1899, the amount of coal won by machines in Illinois had not reached 4,000,000 tons in any one year. In 1899 it exceeded 6,000,000 tons. This remarkable increase in 1899 is explained in part by the fact that a large number of machines reported in 1898 were not introduced until late in that year, and their influence on the tonnage was not apparent. Further explanation is found in the strikes which paralyzed the coal-mining industry of Illinois in 1898, causing a decrease of nearly 1,500,000 tons in the total product, and affecting particularly some of the mines in which machines were used. There was a decrease of over 500,000 tons in the machine-mined product of Illinois in 1898 as compared with the preceding year. West Virginia was next to Pennsylvania in the number of machines added in 1899. There was a gain of 68 machines in West Virginia in 1899 as compared with 1898, but as some of these were not installed until late in the year the tonnage did not increase in proportion. There was, however, an increase of over 550,000 tons in the machine-mined product. Ohio added 33 machines to the number reported in 1898 and 1,631,149 tons to the product won by them. Colorado increased the number of machines in use from 43 to 63, and added over 300,000 tons, or about 133 per cent, to the machine tonnage. In this State, as in Illinois, the product in 1898 was reduced by strikes. The changes made in the other States were unimportant.

The coal mined by machines in 1899 constituted 23.00 per cent of the total product as compared with 20.39 per cent in 1898, 16.19 per cent in 1897, and 14.17 per cent in 1896.

The statistics of the production of coal by machines in 1891, 1896, 1897, 1898, and 1899 are shown in the following table:

Bituminous coal mined by machines in the United States in 1891, 1896, 1897, 1898, and 1899.

State.	Number of firms using machines.					Number of machines in use.				
	1891.	1896.	1897.	1898.	1899.	1891.	1896.	1897.	1898.	1899.
Alabama			3	2	5			45	37	53
Alaska	1	1	(a)	(a)			6	6	(a)	(a)
Arkansas	1	1		1	1		14	15	21	16
Colorado	1	6	8	8	3	20	34	37	43	63
Illinois	16	21	35	40	64	241	307	320	392	440
Indiana	3	11	11	13	15	47	186	174	233	247
Indian Territory		3	3	4	4		56	54	75	74
Iowa	2	5	7	9	4	9	45	49	56	41
Kansas			1	1	1			1	2	3
Kentucky			13	16	16			162	158	189
Maryland					2					8
Michigan				1	4				7	25
Missouri		1	1	1	3		4	3	4	9
Montana		3	2	4	5		62	61	62	75
New Mexico				2	2				29	14
North Dakota		1	1	3	2		1	2	7	5
Ohio	19	31	39	52	53	114	209	224	245	278
Pennsylvania	7	41	64	99	103	72	454	690	1,085	1,343
Tennessee			2	4	5			8	19	22
Texas			1	1				5	5	
Utah		1					1			
Virginia			1	1	1			8	8	8
Washington		1			1		3			2
West Virginia	1	7	13	22	38	8	25	47	86	154
Wyoming	2	2	4	3	3	34	39	45	48	56
Total	51	136	211	287	335	545	1,446	1,956	2,622	3,125

a Not reported.

Bituminous coal mined by machines in the United States in 1891, 1896, 1897, 1898, and 1899—Continued.

State.	Number of tons mined by machines.				
	1891.	1896.	1897.	1898.	1899.
Alabama			294,384	298,170	260,444
Alaska		15,232	17,920	(a)	(a)
Arkansas		21,094	87,532	152,192	146,899
Colorado	284,646	318,172	352,400	225,646	527,115
Illinois	3,027,305	3,871,410	3,946,257	3,415,635	6,085,312
Indiana	212,830	964,378	1,023,361	1,414,342	1,713,125
Indian Territory		191,585	263,811	274,370	276,180
Iowa	41,540	84,556	181,209	218,852	124,721
Kansas			4,500	11,722	40,271
Kentucky			1,299,436	1,366,676	1,625,809
Maryland					16,545
Michigan				1,456	64,055
Missouri		47,827	59,692	52,864	55,154
Montana		579,414	720,345	681,613	843,710
New Mexico				163,849	260,773
North Dakota		15,000	20,000	65,030	38,066
Ohio	1,654,081	3,368,349	3,843,345	5,191,375	6,822,524
Pennsylvania	431,440	6,092,644	8,925,293	16,512,480	22,000,722
Tennessee			47,207	152,002	208,033
Texas			11,750	15,340	
Utah		760			
Virginia			323,649	244,170	265,000
Washington		3,920			14,640
West Virginia	205,784	430,944	673,523	1,323,929	1,881,125
Wyoming	354,106	419,647	555,526	631,431	693,712
Total	6,211,732	16,424,932	22,649,220	32,413,144	43,963,933

a Not reported.

MINERAL RESOURCES.

Bituminous coal mined by machines in the United States in 1891, 1896, 1897, 1898, and 1899—Continued.

State.	Total tonnage.				
	1891.	1896.	1897.	1898.	1899.
Alabama			5, 893, 770	6, 535, 283	7, 593, 416
Alaska		15, 232	17, 920	(a)	(a)
Arkansas		675, 374	856, 190	1, 205, 479	843, 554
Colorado	3, 512, 632	3, 112, 400	3, 361, 703	4, 076, 347	4, 776, 224
Illinois	15, 660, 698	19, 786, 626	20, 072, 758	18, 599, 299	24, 439, 019
Indiana	2, 973, 474	3, 905, 779	4, 151, 169	4, 920, 743	6, 006, 523
Indian Territory		1, 366, 646	1, 336, 380	1, 381, 466	1, 537, 427
Iowa	3, 825, 495	3, 954, 028	4, 611, 865	4, 618, 842	5, 177, 479
Kansas			3, 054, 012	3, 406, 555	3, 852, 267
Kentucky			3, 602, 097	3, 887, 908	4, 607, 255
Maryland					4, 807, 396
Michigan				315, 722	624, 708
Missouri		2, 331, 542	2, 665, 626	2, 688, 321	3, 025, 814
Montana		1, 543, 445	1, 647, 882	1, 479, 803	1, 496, 451
New Mexico				992, 288	1, 050, 714
North Dakota		78, 050	77, 246	83, 895	98, 800
Ohio	12, 868, 683	12, 875, 202	12, 196, 942	14, 516, 867	16, 500, 270
Pennsylvania	42, 788, 490	49, 557, 453	54, 417, 974	65, 165, 133	74, 150, 175
Tennessee			2, 888, 849	3, 022, 896	3, 330, 659
Texas			639, 341	686, 734	
Utah		418, 627	521, 560		
Virginia			1, 528, 302	1, 815, 274	1, 105, 791
Washington		1, 195, 504			2, 029, 881
West Virginia	9, 220, 665	12, 876, 296	14, 248, 159	16, 700, 999	19, 252, 995
Wyoming	2, 327, 841	2, 229, 624	2, 597, 886	2, 863, 812	3, 837, 392
Total	93, 177, 978	115, 921, 828	139, 866, 071	158, 963, 666	191, 144, 218

a Not reported.

Bituminous coal mined by machines in the United States in 1891, 1896, 1897, 1898, and 1899—Continued.

State.	Percentage of total product mined by machines.				
	1891.	1896.	1897.	1898.	1899.
Alabama			4.99	4.56	3.43
Alaska		100.00	100.00	(a)	(a)
Arkansas		3.12	10.22	12.63	17.41
Colorado	8.10	10.22	10.48	5.54	11.03
Illinois	19.33	19.57	19.66	18.36	24.90
Indiana	7.16	24.69	24.65	28.74	28.52
Indian Territory		14.02	19.74	19.86	17.96
Iowa	1.09	2.14	3.93	4.74	2.21
Kansas			0.15	0.34	1.04
Kentucky			36.07	35.15	35.29
Maryland					0.34
Michigan				0.46	10.20
Missouri		2.56	2.24	1.97	1.80
Montana		37.54	43.71	46.06	56.38
New Mexico				16.51	24.81
North Dakota		19.22	25.80	77.51	38.52
Ohio	12.85	26.16	31.51	35.76	41.35
Pennsylvania	1.01	12.29	16.40	25.34	29.67
Tennessee			1.63	5.03	6.04
Texas			1.84	2.23	
Utah		0.18			
Virginia			21.18	13.45	23.06
Washington		0.33			0.72
West Virginia	2.23	3.35	4.73	7.93	9.27
Wyoming	15.21	18.82	21.38	22.05	18.07
Average	6.66	14.17	16.19	20.39	23.00

a Not reported.

In the following table is exhibited a detailed statement of the number of machines of each make in use in the bituminous coal mines of the United States in 1899. The pick or "punching" machines exceed in number, there being 1,997 out of a total of 3,125. Of the remainder, 1,106 were chain breast machines and 22 "long wall." The latter are used only in the States west of the Mississippi River—Arkansas, Iowa, Kansas, and Missouri.

The pick machines include 992 Harrison, 317 Sullivan, 590 Ingersoll-Sargeant, and 98 "other" makes, or of which the make was not reported. The chain machines include 114 Jeffrey air, 450 Jeffrey electric, 401 Morgan-Gardner electric, 95 Independent or Link-Belt electric, 15 Morgan-Standard electric, and 31 other.

In the following table is shown the number of each kind of machine in use in the bituminous coal fields of the United States in 1899.

Kinds of machines used in mining bituminous coal.

State.	Pick machines.				Chain breast machines.							Long wall.	Total.	Tonnage mined by machines in 1899.
	Harrison.	Sullivan.	Ingersoll-Sargeant.	Others.	Jeffrey air.	Jeffrey electric.	Independent, or Link-Belt.	Morgan-Gardner.	Morgan-Standard.	Others.				
Alabama	2	1	38		10						2	53	260,442	
Arkansas						12	4					16	146,899	
Colorado	27	2	5	3	3	19		4				63	527,115	
Illinois	180	35	130	18		39	23	15				440	6,085,312	
Indiana	149	6	8				5	63	12	4		247	a 1,713,125	
Indian Territory	21	1	30			11	2				6	74	276,180	
Iowa	22				9	4					6	41	124,721	
Kansas								3				3	40,271	
Kentucky	89	11	39		8	14	15	13				189	1,625,809	
Maryland	2		6									8	16,545	
Michigan	12		5			1		7				25	64,056	
Missouri				1							8	9	55,154	
Montana	35		30			1	9					75	b 843,710	
New Mexico						1	4	9				14	260,773	
North Dakota		4				1						5	38,066	
Ohio	16		2		31	100	2	112	3	12		278	6,822,524	
Pennsylvania	386	236	254	68	50	198	25	122		4		1,343	c 22,000,722	
Tennessee	2	4	10			6						22	208,033	
Virginia				8								8	265,000	
Washington	2											2	14,640	
West Virginia	40	15				40	6	53				154	d 1,881,125	
Wyoming	7	2	33		3					11		56	693,712	
Total	992	317	590	98	114	450	95	401	15	31	22	3,125	43,963,933	

COAL-TRADE REVIEW.

The year 1899 was the most remarkable one in the history of the coal-mining industry in the United States. Not only was the production the largest ever recorded by nearly 34,000,000 short tons, but prices also showed a general improvement throughout the country. Anthracite experienced an unusual season of prosperity, as shown by a production of 53,944,647 long tons, an output greater by 2,161,525 long tons than the hitherto unprecedented record of 1895, with an advance, considering all marketable sizes, of 5 cents per ton in the average price for the year. There was somewhat of an unusual demand for anthracite when the year opened, due partly to the severe winter weather, which caused a general increase in the household consumption, and, as stocks had not accumulated to any extent, prices were at a profitable figure from the start. According to Mr. F. E. Saward, in his annual report, "The Coal Trade," the course of the anthracite coal trade during the year was entirely different from that of 1898, in that it proved stronger than was anticipated. During the spring months retail dealers adopted a waiting policy and bought only in small quantities, with the result that during the summer considerable coal began to accumulate in first hands, and, while circular prices were advanced July 1, most of the coal was sold at former prices, and there was some shading off from them. The change came in September, when buying began in unprecedented volume, and coal was shipped in such enormous quantities that the railroads were not able to satisfactorily handle it. This condition prevailed until the middle of December. Circular prices were again advanced in September, and, braced up by the exceptional demand, were readily maintained.

How the record of 1899 compared with former years may be seen from the following table, showing the shipments from the anthracite region for the past six years and the average prices received per long ton at the mines:

Shipments of anthracite coal and average prices at the mines for six years.

Year.	Shipments.	Average price.
	<i>Long tons.</i>	
1894.....	41,391,200	\$1.85
1895.....	46,511,477	1.72
1896.....	43,177,485	1.85
1897.....	41,637,864	1.85
1898.....	41,899,751	1.75
1899.....	47,823,241	1.80

In the bituminous trade the production and consumption were limited only by the ability of railroads to furnish the cars and provide the means of hauling them, and in some cases by the ability of operators to secure the labor sufficient to keep the tonnage up to the demand. It was the first time in many years that the productive capacity of the bituminous mines was not in excess of the market requirements for at least a portion of the year. In 1898 there were intervals when the demand was in excess of the supply, but in 1899 this condition prevailed practically from January to December. Naturally prices improved, and the year is noteworthy as recording the first reaction from a period of declining prices which had lasted for twelve years.

The wonderful activity which prevailed throughout the year in the iron and steel trade created a demand for coke that kept practically every available oven in the country operating to its full capacity and taxed the railroads entering the coking districts to provide transportation for the output. The entire year was one of remarkable activity in all branches of the coal business and will have a notable place in the history of the trade. One of the effects of the enormous increase in production was the placing of the United States ahead of Great Britain as the leading coal producer of the world.

A condensed statement of the receipts of coal at some of the important centers is shown in the following table. Statistics regarding the receipts at New York Harbor are not obtainable. In the statement given Cincinnati and Toledo, Ohio, are shown to be the only ones in which the receipts in 1899 were less than in 1898.

Coal receipts at important centers.

	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
Philadelphia (long tons):					
Anthracite	5, 193, 898	4, 981, 697	5, 423, 045	441, 348	.....
Bituminous	4, 608, 092	5, 156, 602	5, 314, 460	157, 858	.....
Boston (long tons):					
Anthracite	1, 981, 119	1, 866, 877	2, 226, 094	359, 217	.....
Bituminous	1, 656, 919	1, 768, 442	1, 841, 394	72, 952	.....
Pittsburg (a) (short tons)	15, 887, 345	18, 467, 086	22, 784, 206	4, 317, 120	.....
Buffalo:					
Anthracite	4, 109, 052	4, 225, 000	.....	.....	.....
Bituminous	2, 616, 185	3, 081, 446	.....	.....	.....
Cleveland:					
Anthracite	201, 756	179, 891	202, 782	22, 891	.....
Bituminous	3, 779, 305	4, 533, 721	4, 857, 295	323, 574	.....

a Anthracite and bituminous

Coal receipts at important centers—Continued.

	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
Toledo (a)	2, 984, 834	3, 877, 678	3, 837, 736	.....	39, 942
Chicago (short tons):					
Anthracite	1, 776, 400	1, 840, 858	2, 146, 554	305, 696	.....
Bituminous	5, 373, 852	4, 976, 779	6, 463, 506	1, 486, 727	.....
Milwaukee (short tons):					
Anthracite	645, 432	768, 150	922, 321	154, 171	.....
Bituminous	910, 376	920, 911	997, 543	76, 632	.....
St. Louis (short tons):					
Anthracite	172, 933	225, 616	292, 118	66, 502	.....
Bituminous	3, 349, 239	3, 342, 498	4, 124, 629	782, 131	.....
Cincinnati (short tons):					
Anthracite	50, 050	37, 925	51, 650	13, 725	.....
Bituminous	3, 100, 431	3, 319, 793	3, 100, 011	.....	219, 782

a Anthracite and bituminous.

NEW YORK CITY.

The following review of the coal trade of New York has been prepared for this report by Mr. H. S. Fleming, secretary of the Anthracite Coal Operators' Association.

The anthracite coal market in New York at the beginning of 1899 was in an extremely unsatisfactory condition. During the first six months of the previous year, 1898, a strong effort had been made to keep the production within the consumption, in order to prevent unprofitably low prices, but in July and August of that year some of the larger interests threw a large volume of coal upon the market, at the same time contracting for deliveries throughout the remainder of the year at even lower prices than those then current. The result was a demoralized market and low prices, which continued into 1899. Toward the close of January and in the early part of February short periods of cold weather served to stimulate the market slightly, but the buying movement was altogether dependent upon weather conditions. There was, however, a stronger tone in the tide-water and New England markets, owing to the small tonnage produced in February, and March opened with improving prices and a somewhat greater activity. This recovery was almost lost during that month by an excessive tonnage sent to market, and prices sagged in consequence. April continued in about the same condition, though with a growing uncertainty on the part of buyers as to the future course of prices. Toward the close of the month a new circular was announced by the

selling companies, advancing prices 25 cents. This, together with the small production in that month, added further strength to the market, which was increased through May and June, a large tonnage being absorbed in both of these months without disturbing prices.

For the first six months of the year, from January 1 to June 30, the shipments from the mines had been as follows, as compared with 1897 and 1898:

Anthracite shipments in first six months of 1897, 1898, and 1899.

Month.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
January	2,854,435	3,073,410	3,761,766
February	2,519,773	2,761,999	2,810,459
March	2,540,968	2,700,288	3,416,711
April	2,552,170	2,228,750	3,078,088
May	2,723,625	2,399,894	3,557,693
June	2,920,024	3,026,971	4,073,364
Total	16,110,995	16,191,312	20,698,081

The tide-water prices for the same period were as below:

Prices of anthracite at tide water, New York, during first six months of 1897, 1898, and 1899.

[Per long ton.]

Month and size.	1897.	1898.	1899.
January:			
Broken	\$3.346	\$3.289	\$3.179
Egg	3.668	3.566	3.337
Stove	3.867	3.742	3.536
Chestnut	3.544	3.430	3.389
Pea	2.066	2.219	2.207
Buckwheat	1.816	1.762	1.784
Average of chestnut and larger	3.656	3.542	3.395
February:			
Broken	3.373	3.290	3.197
Egg	3.683	3.601	3.310
Stove	3.908	3.835	3.573
Chestnut	3.565	3.604	3.457
Pea	2.127	2.257	2.220
Buckwheat	1.819	1.856	1.794
Average of chestnut and larger	3.683	3.633	3.526

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Prices of anthracite at tide water, New York, during first six months of 1897 1898, and 1899—Continued.

[Per long ton.]

Month and size.	1897.	1898.	1899.
March:			
Broken	\$3. 354	\$3. 312	\$3. 185
Egg	3. 678	3. 653	3. 337
Stove	3. 918	3. 879	3. 556
Chestnut	3. 570	3. 635	3. 536
Pea	2. 149	2. 272	2. 235
Buckwheat	1. 826	1. 815	1. 783
Average of chestnut and larger	3. 685	3. 671	3. 447
April:			
Broken	3. 354	3. 326	3. 186
Egg	3. 676	3. 669	3. 340
Stove	3. 934	3. 877	3. 619
Chestnut	3. 602	3. 631	3. 594
Pea	2. 184	2. 310	2. 218
Buckwheat	1. 845	1. 833	1. 785
Average of chestnut and larger	3. 699	3. 676	3. 486
May:			
Broken	3. 378	3. 339	3. 185
Egg	3. 686	3. 695	3. 382
Stove	3. 948	3. 913	3. 639
Chestnut	3. 628	3. 655	3. 607
Pea	2. 196	2. 307	2. 192
Buckwheat	1. 840	1. 838	1. 763
Average of chestnut and larger	3. 717	3. 702	3. 506
June:			
Broken	3. 379	3. 314	3. 147
Egg	3. 714	3. 709	3. 397
Stove	3. 967	3. 907	3. 662
Chestnut	3. 663	3. 648	3. 631
Pea	2. 212	2. 308	2. 143
Buckwheat	1. 853	1. 832	1. 756
Average of chestnut and larger	3. 741	3. 698	3. 479

This large production, coupled with the facts that it was practically all for consumption and that interior and tide stocks were low, caused some alarm as to an adequate supply for the remainder of the year. Calculating in five-year periods the percentage of anthracite produced in the first and last six months of each has been as follows:

Percentage of anthracite produced in first and last six months from 1884 to 1898—average of five-year periods.

Period.	1884 to 1888.	1889 to 1893.	1894 to 1898.	Average.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
First six months	42. 70	44. 69	42. 14	43. 39
Second six months	57. 30	55. 31	57. 86	56. 41

Assuming the tonnage produced in the first six months of 1899 as being 43.6 per cent of the year's output, it was calculated that nearly 27,000,000 tons, or 4,500,000 per month, would have to be produced in the remaining six months in order to meet the demand. As there was at this time much difficulty experienced in securing sufficient labor at the mines, and since the rolling stock and power of the various railroads was considered inadequate to meet such conditions, it was feared that there might be a scarcity of anthracite.

Notwithstanding this, there was little activity in the market during July or August, though prices were fairly well maintained. In September an active buying movement began, which increased with the announcement of a new circular, advancing prices 50 cents over the May circular. At the same time the selling companies announced that orders taken in preceding months and delivery not accepted prior to October 1 would be canceled. By the beginning of October the market had become exceedingly active. Water rates from New York and Philadelphia to New England points advanced over 50 per cent, and manufacturers were beginning to feel through the scarcity of fuel the results of insufficient motive power and cars on both the bituminous and anthracite railroads. During October and November these conditions were accentuated. The anthracite mines worked as nearly full time as could be done with the men and cars at command. From every point there were complaints of a shortage of coal, and tide prices showed a steady advance, in some cases even above the circular rates. Practically the same conditions existed throughout December, and into January, 1900, making the year 1899 the most satisfactory from the point of tonnage which had been known in the history of the industry.

The shipments during the last six months of the year as compared with the same period in the two preceding years were as follows:

Anthracite shipments in last six months of 1897, 1898, and 1899.

Month.	1897.	1898.	1899.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
July	3, 975, 128	3, 777, 406	4, 189, 250
August	4, 086, 873	3, 783, 288	4, 319, 031
September.....	4, 072, 529	4, 270, 163	4, 365, 649
October	5, 120, 892	4, 765, 165	4, 899, 303
November	4, 538, 450	4, 854, 517	4, 688, 859
December	3, 732, 991	4, 257, 895	4, 505, 025
Total.....	25, 526, 863	25, 708, 434	26, 987, 117

Tide-water prices for the last six months were as below:

Prices of anthracite at tide water, New York, during last six months of 1897, 1898, and 1899.

[Per long ton.]

Month and size.	1897.	1898.	1899.
July:			
Broken	\$3. 400	\$3. 296	\$3. 165
Egg	3. 731	3. 583	3. 445
Stove.....	3. 989	3. 850	3. 720
Chestnut	3. 682	3. 603	3. 666
Pea	2. 194	2. 219	2. 095
Buckwheat	1. 841	1. 818	1. 745
Average of chestnut and larger.....	3. 760	3. 635	3. 562
August:			
Broken	3. 446	3. 249	3. 224
Egg	3. 779	3. 581	3. 501
Stove.....	4. 007	3. 796	3. 752
Chestnut	3. 690	3. 543	3. 725
Pea	2. 186	2. 208	2. 065
Buckwheat	1. 852	1. 801	1. 755
Average of chestnut and larger.....	3. 786	3. 591	3. 521

Prices of anthracite at tide water, New York, during last six months of 1897, 1898, and 1899—Continued.

[Per long ton.]

Month and size.	1897.	1898.	1899.
September:			
Broken	\$3. 427	\$3. 255	\$3. 193
Egg	3. 813	3. 515	3. 490
Stove.....	4. 034	3. 724	3. 832
Chestnut	3. 700	3. 631	3. 822
Pea	3. 167	2. 170	2. 052
Buckwheat	1. 817	1. 805	1. 753
Average of chestnut and larger	3. 804	3. 590	3. 660
October:			
Broken	3. 396	3. 210	3. 209
Egg	3. 799	3. 435	3. 596
Stove.....	4. 000	3. 638	3. 928
Chestnut	3. 567	3. 414	3. 783
Pea	2. 162	2. 151	2. 065
Buckwheat	1. 788	1. 797	1. 750
Average of chestnut and larger	3. 745	3. 461	3. 706
November:			
Broken	3. 355	3. 169	3. 234
Egg	3. 717	3. 373	3. 567
Stove.....	3. 914	3. 596	3. 968
Chestnut	3. 570	3. 373	3. 959
Pea	2. 157	2. 149	2. 173
Buckwheat	1. 767	1. 792	1. 769
Average of chestnut and larger	3. 718	3. 416	3. 769
December:			
Broken	3. 263	3. 133	3. 229
Egg	3. 607	3. 365	3. 656
Stove.....	3. 780	3. 561	4. 028
Chestnut	3. 429	3. 358	4. 042
Pea	2. 160	2. 169	2. 240
Buckwheat	1. 779	1. 763	1. 827
Average of chestnut and larger	3. 567	3. 393	3. 832

BOSTON, MASSACHUSETTS.

Mr. Elwyn G. Preston, secretary of the Boston Chamber of Commerce, has prepared the following statement in regard to the coal trade of that city.

The receipts of coal at Boston during 1899 were the largest on record, exceeding those of 1898 by 616,088 tons, or 17 per cent. The table of receipts of coal at Boston for a series of years is again presented:

Receipts of coal at Boston for seventeen years.

Year.	Domestic.				Foreign.	Total.
	By water.		All rail.			
	Anthracite.	Bituminous.	Anthracite.	Bituminous.		
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>		
1883.						2, 273, 068
1884.						2, 225, 740
1885.						2, 221, 220
1886.					44, 464	2, 500, 000
1887.					13, 966	2, 400, 000
1888.	2, 057, 279	1, 004, 195			10, 081	3, 071, 555
1889.	1, 647, 348	914, 966			5, 538	2, 567, 852
1890.	1, 740, 564	964, 857			14, 072	2, 719, 493
1891.	2, 039, 443	1, 070, 088			5, 842	3, 115, 373
1892.	2, 163, 984	919, 815			1, 416	3, 085, 215
1893.	2, 227, 086	1, 100, 384		a 50, 000	17, 097	3, 394, 567
1894.	2, 237, 599	958, 701		a 71, 303	41, 779	3, 309, 382
1895.	2, 518, 441	977, 762		a 90, 999	21, 009	3, 608, 211
1896.	2, 092, 798	1, 391, 949		a 104, 080	61, 071	3, 649, 898
1897.	1, 948, 283	1, 591, 245	32, 836	65, 674	50, 235	3, 688, 273
1898.	1, 835, 806	1, 706, 929	31, 071	62, 143	17, 122	3, 653, 071
1899.	2, 178, 791	1, 746, 780	47, 303	94, 614	201, 671	4, 269, 159

a Total anthracite and bituminous.

Of the gross receipts of domestic coal, 461,827 tons of anthracite and 647,533 tons of bituminous, a total of 1,109,360 tons, were forwarded to interior New England points by rail, leaving the net receipts at Boston as follows: Anthracite, 1,764,267 tons; bituminous, 1,395,532 tons, a total of 3,159,799 tons, or an increase in the net receipts at Boston, representing local consumption, of 538,696 tons, or 20 per cent.

The year opened with a scarcity of tonnage and high rates, which prevented the replenishment of stocks, and at times during the early months of the year fears were entertained of a soft-coal famine. These fears were not, however, realized until late in the year, when, owing to a scarcity of tonnage and a shortage of cars, stocks were reduced to the vanishing point and phenomenally high prices were obtained. During this period, owing to the scarcity of water tonnage, the demurrage clause "after six days" was the usual feature of charter parties.

Carriers' rates covered an extraordinary range, as shown by the following table:

Coal freights to Boston, Massachusetts.

From—	Per ton.
Philadelphia.....	\$0.70 to \$2.10
Baltimore .....	.80 to 2.25
Norfolk and Newport News.....	.70 to 2.00
New York.....	.45 to 1.50

The extreme rates were secured during the last two months of the year and the lowest rates were obtained in May.

Prices in the local market have been governed almost entirely by the transportation conditions. The year opened with anthracite stove coal quoted at \$5, an increase to \$6 being secured during February, March, and April. A local rate quarrel reduced the prices to \$4.50 in May, from which it recovered to \$5 in July, and later advanced to \$6 per ton, at which figure the year closed.

Georges Creek Cumberland covered a range of from \$3 free on board cars to \$5 or more alongside at Mystic Wharf. During the last three months of the year the scarcity of this grade of coal caused the price to advance rapidly, and even the extreme figures named do not represent the highest price obtained at times for individual lots.

The soft coal shortage caused a large increase in the importations of Provincial coal, the total receipts being 201,671 tons as against 17,122 tons in 1898, and 61,071 tons in 1896, the largest previous year.

The following table shows the receipts of coal at Boston for shipment to interior points and the net receipts for consumption, by months, during 1899:

Monthly receipts of coal at Boston for 1899, with comparisons.

Month.	Receipts, all routes.		Amount forwarded to interior New England points.		Net receipts (for local consumption).	
	Anthracite.	Bituminous.	Anthracite.	Bituminous.	Anthracite.	Bituminous.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
January . . .	181,963	161,593	41,608	45,037	140,355	116,556
February . .	101,554	100,538	31,663	33,317	69,891	67,221
March	180,907	155,933	30,321	36,332	150,586	119,601
April	170,976	198,089	26,092	54,982	144,884	143,107
May	208,896	208,809	42,650	71,194	166,246	137,615
June	231,592	167,297	44,552	58,372	187,040	108,925
July	226,355	188,692	36,748	58,199	189,607	130,493
August	202,199	142,117	44,279	72,987	157,920	69,130
September . .	171,606	180,977	35,080	66,781	136,526	114,196
October . . .	195,278	184,165	47,099	49,108	148,179	135,057
November . .	195,568	162,484	38,221	43,041	157,347	119,443
December . .	159,200	192,371	43,514	58,183	115,686	134,188
Total, 1899.	2,226,094	2,043,065	461,827	647,533	1,764,267	1,395,532
1898.	1,866,877	1,786,194	368,960	663,008	1,497,917	1,123,186
1897.	1,981,119	1,707,154	418,171	734,541	1,562,948	972,613

PHILADELPHIA, PENNSYLVANIA.

The following review has been prepared for this report by Mr. Samuel R. Kirkpatrick, railroad editor of the Philadelphia Press:

During the latter part of 1899 there was a regular boom in the anthracite coal trade in Philadelphia. For the first time in years the large storage yards of the Philadelphia and Reading Railway Company at Port Richmond were without coal. Usually there is stored at this place from 250,000 to 350,000 tons of various sizes of anthracite; but on December 31, 1899, and for many days prior thereto, there was no coal, and the daily arrivals were something less than a few hundred cars. Prices during the last six months were better, notwithstanding the production was greater than ever before. As a whole, 1899 was a prosperous anthracite coal year, and better prices were obtained. During the early months cutting was rampant, and while the year opened slightly better than in 1898 there was no cause for rejoicing,

as cutting soon became in order, and prices for domestic sizes were from 10 to 25 cents below the figures for the corresponding period in the previous year. The dealers were buyers of only small lots, but the operators began to seek other markets, and the coal was diverted to other cities. After a few months of low prices there was a better undertone displayed, and the operators began to refuse to take orders unless for shipment within a stipulated time. In April the first signs of better prices began, and they kept steady until September, when the demand became greater than the local supply, and in December the best prices of the year were obtained. While the prices of egg, stove, and nut sizes were strong, there was a disposition to shade the price of broken. During 1899 the aggregate of the shipments of anthracite and bituminous coal to this city was 10,737,505 tons, a gain of 599,206 tons over the corresponding period in 1898, and considerably more than in 1897.

The bituminous coal trade was in better shape than it has been for years, although up to September 1 prices were generally very low. The general prosperity created a big demand for soft coal. Furnaces that had been shut down for years were started up, and this, with a big demand by manufacturing establishments, caused a great rush for this fuel, and during the latter part of the year fancy prices prevailed. From January to September the price for Clearfield coal at the mines ran from 80 cents to \$1 a ton, from October to November from \$1 to \$1.50, and from that time on to December 31 from \$1.50 to \$3.50. During the last few months there was no regular price for bituminous coal; the price changed from day to day, and often a fancy price was paid by a consumer who wanted the coal very bad. Georges Creek coal brought from 25 to 50 cents a ton more than the Clearfield output.

Owing to the great wave of prosperity which swept over the country there was a big demand for bituminous coal, and while the consumption by the local manufacturers was only slightly in excess of 1898 many of the manufacturing establishments were compelled to use anthracite coal, as they could not secure enough bituminous to meet their wants. The soft coal companies in the South were not so anxious to break prices as heretofore, and the Pennsylvania operators were inclined to meet them more than half way. The tide-water tonnage from this port was larger than in 1898, amounting to 3,373,047 tons as against 3,229,000 tons in the previous year, 2,630,000 tons in 1897, and 2,320,000 tons in 1896. The amount of bituminous coal sold for local use was 1,482,147 as against 1,451,000 for the previous year. The sharp advance in prices toward the close of the year caused many consumers of soft coal to purchase free-burning anthracite. There was also a great scarcity, as the operators were unable to secure enough coal cars to fill their orders.

The local consumption of bituminous coal would have been considerably greater if the producers had been able to fill their orders. There was a good demand, but the operators at times were compelled to refuse any new orders, as it was impossible to procure the necessary cars. The consumption of bituminous coal by the local manufacturers, as stated above, was 1,482,147 tons, an increase over the previous year of 31,147 tons. There would have been, no doubt, a greater increase in the amount of this fuel used if the manufacturers had been able to secure all they needed. Since the local gas works have become the property of the United Gas Improvement Company, there has been a tendency to cut down the amount of bituminous coal used, and while in former years about 300,000 tons were used annually by the city when it manufactured its own gas, it is stated that, although a greater quantity of gas is now made, there has been little, if any, increase in the amount of coal consumed. While the increase in bituminous coal is comparatively slight, the manufacturers are busier than they have been for years, and a number of them use large quantities of pea coal. Toward the close of the year fancy prices for bituminous coal were demanded, and it was almost impossible to secure spot coal at a reasonable figure. The outlook of the closing year was very encouraging, and as all the large soft-coal carrying companies have ordered additional cars, it is thought there will not be the trouble during the year of 1900 that there was in 1899. The principal drawback was the inability of the railroads to supply enough cars to enable the producers to meet their orders.

Owing to the scarcity of bituminous coal there was a better market created for anthracite coal, but the competition between producers of both of these fuels is as keen as ever, and while there was not so much gain showed in the consumption of bituminous coal as it was thought there would be, it is understood that as soon as the soft coal operators can guarantee to furnish this coal regularly and at all times, more of it will be used. Owing to the frequent strikes in bituminous coal fields and the inability of the shippers to secure all the cars that are needed, there is not that disposition on the part of the consumer that there would be if he were sure of a steady supply. The introduction of soft coal as a fuel into a number of large factories has been a severe blow to anthracite dealers, and while the changes last year were not so great as they would otherwise have been, yet there are many manufacturers having plants within a short distance of Philadelphia who have introduced soft coal as a fuel. It is doubtful, however, if there will be as much change made as is expected, as, owing to the scarcity of this fuel and the low price at which some sizes of anthracite can be bought, it is thought many manufacturers who have contemplated a change will not be in a hurry to make it. The bituminous coal trade is quick to go off, and unless the combination of railroads

that has lately entered into this business takes a firm stand it is not likely, in some sections of this city and the State, that bituminous coal will take the place of anthracite.

The anthracite coal trade, as a whole, was in better shape than it has been for a number of years, and while during the first few months there was a chaotic order of things, the situation cleared and during the last half the trade was at its best. At no time for several years, or since the time when President McLeod of the Philadelphia and Reading Railroad Company attempted to regulate prices, has the trade been in better shape. The production was the largest in the history of the anthracite coal trade, but at the close of the year few of the companies had much stock on hand. The Philadelphia and Reading Coal and Iron Company, which mines the largest amount of coal, had on December 31, 1899, only a small quantity of coal on hand at its various storage yards. At Port Richmond, where there is usually from 250,000 to 300,000 tons, there was not a ton. The shipments from this port to cities and towns was 1,947,483 tons, as against 1,469,000 tons in 1898, 1,600,000 tons in 1897, and 1,770,000 tons in 1896. This increase was due to the general prosperity throughout the New England States, the demand being greater than the supply. The local consumption of anthracite was placed at 3,457,482, as against 3,500,000 tons in 1898 and 3,570,000 long tons in 1897. It is, however, believed that, owing to the severe competition of the various coal companies in the city, there was more coal used in 1899 than they accounted for, and that the consumption in this city was equally as large as that of the previous year.

The price circulars of the Philadelphia Coal and Iron Company, which constitute the standard, quoted the following prices:

Size.	1898.		1899.			
	January.	April.	March.	July.	October.	December.
Lump and steamboat.	\$2. 50	\$2. 50	\$2. 50	\$2. 50	\$2. 50	\$2. 50
Broken.....	2. 50	2. 25	2. 25	2. 35	2. 45	2. 45
Egg.....	2. 90	2. 65	2. 40	2. 60	2. 55	2. 55
Stove.....	3. 00	2. 75	2. 50	2. 70	2. 95	2. 95
Chestnut.....	2. 80	2. 50	2. 50	2. 70	2. 95	2. 95
Pea.....	1. 50	1. 50	1. 50	1. 50	1. 50	1. 75
Buckwheat.....	. 80	. 85	. 85	. 85	. 85	1. 00

Up to March the 1898 circulars prevailed, and there were circulars issued nearly each month, although the prices did not change much until near the end of the year. The above prices are subject to the usual agents' commission of 15 cents per ton. They are for coal free on board

cars at the mines, and railroad freight charges must be paid in addition. During the first seven months of the year prices were freely cut. Toward the close of 1899 the market stiffened up, and even the individual operators maintained circular prices. During the last month there was a good demand for nearly all sizes of anthracite coal, and although the weather was moderate the dealers were kept busy. The lowest recorded prices were made in January and February, and from that time on there was a steady advance. In December, \$2.95 a ton was paid for stove coal, and there were a few orders delivered at a higher price, but outside of the usual commission the dealers and middlemen paid the regular circular prices. The following table shows the actual selling prices of prepared sizes for the years 1896, 1897, 1898, and 1899:

Selling prices of prepared anthracite coal at the mines for Philadelphia for four years.

Month.	Sizes.	1896.	1897.	1898.	1899.
January	Broken....	\$2. 25	\$2. 40	\$2. 00	\$2. 10
	Egg	2. 65	2. 80	2. 40	2. 15
	Stove	2. 75	2. 90	2. 50	2. 25
	Nut	2. 50	2. 65	2. 30	2. 25
	Pea				1. 15
February	Broken....	2. 25	2. 40	2. 00	2. 10
	Egg	2. 65	2. 80	2. 40	2. 15
	Stove	2. 75	2. 90	2. 50	2. 25
	Nut	2. 50	2. 65	2. 30	2. 25
	Pea				1. 15
March	Broken....	2. 25	2. 40	2. 00	2. 25
	Egg	2. 65	2. 80	2. 40	2. 40
	Stove	2. 75	2. 90	2. 50	2. 50
	Nut	2. 50	2. 65	2. 30	2. 50
	Pea				1. 15
April	Broken....	2. 25	2. 40	2. 00	2. 25
	Egg	2. 65	2. 80	2. 40	2. 40
	Stove	2. 75	2. 90	2. 50	2. 50
	Nut	2. 50	2. 65	2. 30	2. 50
	Pea				1. 15
May	Broken....	2. 25	2. 25	2. 10	2. 25
	Egg	2. 65	2. 50	2. 15	2. 40
	Stove	2. 75	2. 75	2. 25	2. 50
	Nut	2. 50	2. 65	2. 10	2. 50
	Pea				1. 15
June	Broken....	2. 25	2. 25	2. 10	2. 25
	Egg	2. 65	2. 65	2. 30	2. 30

Selling prices of prepared anthracite coal at the mines for Philadelphia for four years—
Continued.

Month.	Sizes.	1896.	1897.	1898.	1899.
July	Stove	\$2. 75	\$2. 75	\$2. 25	\$2. 40
	Nut	2. 50	2. 50	2. 10	2. 40
	Pea				1. 00
	Broken....	2. 40	2. 40	2. 10	2. 15
	Egg	2. 80	2. 80	2. 30	2. 30
	Stove	2. 90	2. 90	2. 25	2. 40
August	Nut	2. 65	2. 65	2. 10	2. 40
	Pea				1. 00
	Broken....	2. 40	2. 40	2. 00	2. 25
	Egg	2. 80	2. 80	2. 30	2. 40
	Stove	2. 90	2. 90	2. 25	2. 50
	Nut	2. 65	2. 65	2. 10	2. 50
September.....	Pea				1. 00
	Broken....	2. 50	2. 40	2. 00	2. 25
	Egg	2. 90	2. 80	2. 30	2. 50
	Stove.....	3. 00	2. 90	2. 25	2. 60
	Nut	2. 80	2. 65	2. 10	2. 60
	Pea				1. 00
October	Broken....	2. 50	2. 50	2. 00	2. 25
	Egg	2. 90	2. 90	2. 15	2. 60
	Stove.....	3. 00	3. 00	2. 25	2. 70
	Nut	2. 80	2. 80	2. 10	2. 70
	Pea				1. 00
	Broken....	2. 50	2. 25	2. 00	2. 25
November	Egg	2. 90	2. 80	2. 15	2. 85
	Stove.....	3. 00	2. 90	2. 25	2. 95
	Nut	2. 80	2. 65	2. 10	2. 95
	Pea				1. 00
	Broken....	2. 50	2. 25	2. 00	2. 25
	Egg	2. 90	2. 80	2. 15	2. 85
December	Stove.....	3. 00	2. 90	2. 25	2. 95
	Nut	2. 80	2. 65	2. 10	2. 95
	Pea				1. 75
	Broken....	2. 50	2. 25	2. 00	2. 25
	Egg	2. 90	2. 80	2. 15	2. 85
	Stove.....	3. 00	2. 90	2. 25	2. 95

There was no change in freight rates for local delivery during the year. The charges, which vary according to the region from which the shipment is made and according to the size of coal, were as follows:

Freight rates on anthracite coal from regions to Philadelphia.

Regions.	Prepared sizes.	Pea.	Buckwheat.
Schuylkill	\$1.70	\$1.40	\$1.25
Lehigh	1.75	1.45	1.30
Wyoming	1.80	1.50	1.35

The consumption of pea coal by the householder grows larger every year, and in 1899 it was greater than ever before. This coal is cheaper and retails from \$1.25 to \$1.75 a ton below the selling price of egg coal and chestnut. Formerly it cost the dealer from \$1.10 to \$1.40 below the price of stove at the mines. It is used in a large measure by the passenger railway companies at their power houses, at the city pumping stations, at the water department, and in a number of instances by large manufacturers. The bulk of this coal, however, is sold by the dealers for domestic purposes. There was formerly great reluctance to use this coal, as it was full of dirt and slate, but recently the coal companies have made a number of improvements in the machinery for preparing it for the market, and it now comes to the dealer and consumer as uniform in size and free from slate and dirt as the so-called prepared sizes. Notwithstanding there is a disposition on the part of the coal companies to advance the price of this coal, there was little change made until December, when the price at the mines jumped from \$1 to \$1.75 a ton. At this time there was a good demand for this coal and the coal companies had trouble in filling their orders. Notwithstanding there was an increase in demand for this coal there was also more of chestnut size used, and this size is finding its way rapidly in every household. Pea coal was at one time more extensively used than it is now by manufacturers, but owing to the increasing demand for domestic purposes and a higher price the manufacturers are burning buckwheat coal, or what is known as No. 2 pea, and in many instances rice size is being used.

The shipments of coal to foreign countries out of this port were smaller than in 1898, which is due in a measure to the ending of the war between this country and Spain, as at that time large quantities of coal were shipped south to be used on our war vessels. As heretofore, the majority of the anthracite coal exported was shipped to Cuba, 11,386 long tons, with a value of \$35,677, out of a total of 18,080 tons going to that island. Most of the bituminous coal was also sent to Cuba, a total of 223,008 long tons out of 459,266 tons being

shipped there. Since the close of the war in Cuba and the starting up of a number of the idle factories there, there was a better demand for our coal. During the latter part of 1899 the supply of vessels for coastwise ports was inadequate and freight rates were considerably higher, advancing from about 90 cents to \$2.10 a ton to Boston. To points this side the rate was from 10 to 15 cents less. The cause of this sharp advance in ocean freight rates was the scarcity of vessels, as the demand for all kinds of vessels which carry general merchandise was so great that few could be had to carry coal. During 1899 there was little change made in regard to the manner in which coal was carried to Boston and other New England ports. The railroad companies are constantly increasing their ocean fleets, and it is estimated that at least 80 per cent of the business is done by them. The Reading Company has been foremost in extending its transportation system, and it has a large fleet plying between this city and Boston.

Through the courtesy of the officers of the Pennsylvania Railroad Company, the Philadelphia and Reading Railway Company, and the Baltimore and Ohio Railroad Company, data have been furnished from which the following table has been compiled. It shows the distribution of coal at Philadelphia for the export trade, the coastwise and harbor trade, and the Philadelphia local trade. The figures of 1898 are also given for the purpose of comparison.

Distribution of coal at Philadelphia in 1898 and 1899.

[In tons of 2,240 pounds.]

	1898.		1899.	
	Anthracite.	Bituminous.	Anthracite.	Bituminous.
Export	12, 697	476, 602	18, 080	459, 266
Coastwise and harbor..	1, 469, 000	3, 229, 000	1, 947, 483	3, 373, 047
Local	3, 500, 000	1, 451, 000	3, 457, 482	1, 482, 147
Total	4, 981, 697	5, 156, 602	5, 423, 045	5, 314, 460

PITTSBURG, PENNSYLVANIA.

The accompanying statistics, showing the movement of coal in this most important shipping and manufacturing center, have been compiled from reports made to the Survey by officials of the railroads entering Pittsburg and by the United States Army officers in charge of the Monongahela and Ohio River improvements. Although more coal is shipped to and through Pittsburg than is handled in any other city in the United States, there is no local bureau devoted to the collection of statistics of the city's manufacturing and transportation industries. The officials furnishing the information for this report, and to whom special acknowledgment is due, are Mr. J. G. Searles,

coal freight agent, Pennsylvania Railroad, Philadelphia, Pennsylvania; Mr. W. L. Andrews, assistant coal and coke agent, Baltimore and Ohio Railroad, Pittsburg; Mr. James Means, division freight agent, Pittsburg, Cincinnati, Chicago and St. Louis Railroad, Pittsburg; Mr. Edwin P. Bates, general freight agent, Allegheny Valley Railway, Pittsburg; Mr. F. A. Dean, general freight agent, Pittsburg and Lake Erie Railroad, Pittsburg; Maj. W. H. Bixby, United States Army, in charge of Ohio River improvements; Maj. Charles F. Powell, United States Army, in charge of Monongahela River improvements.

The total movement of coal to and through Pittsburg in 1899 was 22,784,206 short tons, an increase of 4,377,120 tons, or 24 per cent over that of 1898. The effect of the boom in the iron trade upon the coal is shown in this statement, as in other portions of this report. Pittsburg, as the center of the iron trade of the world, consumes enormous quantities of coal and coke. This statement does not include the coke movement, but it shows that the local consumption of coal at Pittsburg in 1899 increased 3,618,580 tons, about 44 per cent over 1898.

It will be observed from the following table that 35 per cent of the total receipts and more than 50 per cent of the increases in 1899 were in "river" coal:

Shipments of coal to and through Pittsburg in 1896, 1897, 1898, and 1899.

Transportation route.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Pennsylvania R. R.:						
To Pittsburg and vicinity	1,344,685	1,379,718	1,328,540	1,698,240	369,700	.....
To west of Pittsburg.	688,740	1,206,598	1,283,032	1,459,546	176,494	.....
Baltimore and Ohio R.R.:						
To Pittsburg district.	552,031	395,265	430,139	546,679	116,540	.....
To west of Pittsburg.	839,145	581,851	656,345	950,632	294,287	.....
Pittsburg, Cincinnati, Chicago, and St. Louis R. R. ^a	2,585,547	2,369,022	2,783,816	3,322,227	538,411	.....
Allegheny Valley Rwy.: ^b						
To Pittsburg district.	162,945	125,445	125,180	145,924	20,744	.....
To west of Pittsburg.	64,887	20,721	39,977	6,332	.....	33,645
Pittsburg and Lake Erie R. R.:						
Local and Pittsburg.	1,524,357	1,506,296	1,840,000	2,125,173	245,173	.....
To west of Pittsburg.	3,048,715	3,012,591	3,759,237	4,250,346	491,109	.....
Monongahela River locks:						
To Pittsburg district.	1,607,062	2,619,469	3,141,306	5,569,967	2,428,661	.....
To west of Pittsburg.	4,102,190	2,670,369	2,979,494	2,709,140	.....	270,354
Total shipments ...	16,620,304	15,887,345	18,407,086	22,784,206	4,377,120	.....
West of Pittsburg ^a ..	10,295,005	8,661,152	10,218,105	10,976,645	758,540	.....
Local consumption	6,325,299	7,226,193	8,188,981	11,807,561	3,618,580	.....

^a Shipments over the Pittsburg, Cincinnati, Chicago and St. Louis Railroad are separated in the same ratio as the totals of other lines. Total shipments only over this line were reported.

^b Coal originating on this road only. Does not include coal received from the Pennsylvania Railroad and forwarded over the Allegheny Valley Railway.

^c Net increase.

MONONGAHELA RIVER SHIPMENTS.

Maj. Charles F. Powell, Corps of Engineers, U. S. A., in charge of Monongahela River improvement, reports the tonnage passing through the locks in 1899 at 8,279,107 tons of 2,000 pounds. Maj. W. H. Bixby, in charge of Ohio River improvement, reports that 2,709,140 tons passed through Davis Island dam. The difference between these amounts (5,569,967 tons) represents approximately the amount of river coal consumed at Pittsburg.

Movements of coal through Monongahela River locks and Davis Island dam.

Year.	Passed through locks on Monongahela River.	Passed Davis Island dam, Ohio River, near Pittsburg. (From annual reports, Ohio River improvement.)	Difference, approximate consumption of river coal at Pittsburg.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
1890.....	4,652,104	3,420,357	1,231,747
1891.....	4,276,588	2,893,752	1,382,836
1892.....	3,872,340	2,299,294	1,573,046
1893.....	3,860,072	2,364,401	1,495,671
1894.....	4,649,612	2,453,787	2,195,825
1895.....	4,183,596	2,393,873	1,789,723
1896.....	5,709,252	4,102,190	1,607,062
1897.....	5,289,838	2,670,369	2,619,469
1898.....	6,120,800	2,979,494	3,141,306
1899.....	8,279,107	2,709,140	5,569,967

RECEIPTS AND SHIPMENTS BY RAIL.

The following tables show the receipts and shipments of coal by railroads entering the Pittsburg district:

Receipts of coal via Pennsylvania Railroad in 1896, 1897, 1898, and 1899.

To—	1896.	1897.	1898.	1899.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Pittsburg and vicinity	1,344,685	1,379,718	1,328,540	1,698,240
West of Pittsburg	688,740	1,206,598	1,283,052	1,459,546
Total.....	2,033,425	2,586,316	2,611,592	3,157,786

Shipments of coal and coke via Baltimore and Ohio Railroad to and through Pittsburg.

Year.	Pittsburg district.		Via Pittsburg to all points.	
	Coal.	Coke.	Coal.	Coke.
	Tons.	Tons.	Tons.	Tons.
1896.....	552,031	447,866	839,145	727,219
1897.....	395,265	487,745	581,851	1,020,430
1898.....	430,139	437,343	656,345	1,610,759
1899.....	546,679	549,086	950,632	1,478,768

Shipments of coal via Allegheny Valley Railway to and through Pittsburg.

Year.	Pittsburg district.	Via Pittsburg to all points.	Total.
	Tons.	Tons.	Tons.
1895.....	162,600	33,399	195,999
1896.....	162,945	64,887	227,832
1897.....	125,445	20,721	146,166
1898.....	125,180	39,977	165,157
1899.....	145,924	6,332	152,256

Shipments of coal over the Pittsburg and Lake Erie Railroad.

Year.	Tons.
1895.....	3,546,598
1896.....	4,573,072
1897.....	4,518,887
1898.....	5,639,237
1899.....	6,375,519

Shipments of coal over the Pittsburg, Cincinnati, Chicago and St. Louis Railroad.

Year.	Tons.
1895.....	2,417,096
1896.....	2,585,547
1897.....	2,369,022
1898.....	2,783,816
1899.....	3,322,227

CLEVELAND, OHIO.

The following summary of the coal trade of Cleveland has been prepared for this report by Mr. F. A. Scott, secretary of the Chamber of Commerce.

The Cleveland coal market for the year 1899 was very erratic as to price, ruling very low during the first eight months of the year, more particularly during June, July, and August, the supply exceeding the demand; but commencing in September a strong demand was created by reason of all the factories and iron works running to their capacity. This, together with the inadequate car supply and extraordinary heavy demand for domestic purposes, created almost a famine during the months of October and November, when prices were higher than at any time for many years, excepting during the memorable miners' strikes of 1894 and 1897.

The price obtained for Ohio coals during the fall of 1899 was helped and the Ohio tonnage increased by reason of the great demand made by the East on Pittsburg and the West Virginia fields, keeping a large tonnage out of Ohio markets. Labor troubles were not numerous during 1899 on account of the interstate agreement of operators and miners.

Coal and coke receipts and shipments at Cleveland since 1887.

RECEIPTS.				
	1887.	1888.	1889.	1890.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Bituminous	1,454,744	1,737,781	1,600,000	1,560,208
Anthracite	176,769	181,551	160,000	205,856
Coke	114,924	124,827	150,000	194,527
Total	1,746,437	2,044,159	1,910,000	1,960,591
SHIPMENTS.				
Anthracite by rail	20,296	29,735	25,000	29,056
Bituminous by rail	703,506	1,000,000	1,100,000	1,200,000
Bituminous by lake				
Total	723,802	1,029,735	1,125,000	1,229,056

Coal and coke receipts and shipments at Cleveland since 1887—(Continued.)

RECEIPTS.				
	1891.	1892.	1893.	1894.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Bituminous	2, 838, 586	3, 651, 080	3, 603, 984	2, 715, 540
Anthracite	201, 927	259, 150	262, 266	207, 604
Coke	189, 640	351, 527	235, 248	298, 061
Total	3, 230, 153	4, 261, 757	4, 101, 498	3, 221, 205
SHIPMENTS.				
Anthracite by rail	34, 910	50, 742	49, 497	44, 177
Bituminous by rail	1, 525, 000	1, 728, 831	24, 128	30, 000
Bituminous by lake			1, 257, 326	1, 106, 000
Coke by rail				42, 048
Total	1, 559, 910	1, 779, 573	1, 330, 951	1, 222, 225

RECEIPTS.					
	1895.	1896.	1897.	1898.	1899.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Bituminous	2, 842, 333	2, 994, 802	3, 779, 305	4, 533, 721	4, 857, 295
Anthracite	201, 022	142, 832	201, 756	179, 891	202, 782
Coke	432, 216	338, 678	503, 935	482, 539	484, 738
Total	3, 475, 571	3, 476, 312	4, 484, 996	5, 196, 151	5, 544, 815
SHIPMENTS.					
Anthracite by rail ..	31, 894	20, 299	33, 750	27, 650	41, 072
Bituminous by rail ..	64, 908	25, 872	71, 770	511, 447	46, 622
Bituminous by lake ..	1, 125, 624	1, 803, 709	2, 027, 693	2, 108, 310	2, 171, 417
Coke by rail	49, 536	85, 256	117, 390	93, 628	129, 146
Total	1, 271, 962	1, 935, 136	2, 250, 603	2, 741, 035	2, 388, 257

MINERAL RESOURCES.

Clearances of coal from the Cuyahoga (Ohio) district for thirteen years.

Year.	Tons.	Year.	Tons.
1887.....	1,433,035	1894.....	2,239,829
1888.....	1,855,260	1895.....	2,948,324
1889.....	2,020,996	1896.....	3,863,645
1890.....	2,328,663	1897.....	3,613,245
1891.....	2,635,461	1898.....	3,844,239
1892.....	2,957,988	1899.....	4,062,869
1893.....	3,052,342		

TOLEDO, OHIO.¹

The receipts of coal at Toledo in 1899 were within a small quantity of the aggregate of 1898, which was 432,000 tons greater than any preceding year. Naturally an increase in the receipts for 1899 was looked for, and the reasons for a deficiency are found in the disturbed condition of lake transportation and large advance in cost of freight, which seriously lessened the demand. There appears to be no reason for expecting a decreased movement from this port, and as the harbor improvement progresses it is anticipated that both coal and iron ore will be attracted to Toledo. The receipts of coal at Toledo for a series of years are shown in the following table.

Coal receipts at Toledo since 1894.

Railroad.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Wabash R. R.....		1,000	5,000	6,000	10,000	10,000
Lake Shore and Michigan Southern Rwy.....	22,126	38,000	44,000	50,000	60,000	75,000
Cincinnati, Hamilton and Dayton R. R.....	72,000	30,000	35,000	40,000	50,000	60,000
Pennsylvania Co.....	78,792		529,968	573,000	782,000	838,736
Columbus, Hocking Valley and Toledo Rwy.....	540,000	500,000	850,000	730,000	1,100,000	1,200,000
Toledo and Ohio Central Rwy..	767,670	721,914	705,272	777,129	883,692	1,039,000
Lake.....	116,000	124,000	119,000	88,705	90,000	70,000
Wheeling and Lake Erie Rwy..	914,220	520,000	646,471	720,000	901,986	545,000
Total.....	2,510,808	1,934,914	2,934,711	2,984,834	3,877,678	3,837,786

¹ From the annual report of Denison B. Smith, Secretary, Produce Exchange.

The total coal receipts at Toledo during the past fourteen years have been as follows:

Total coal receipts at Toledo since 1886.

Year.	Short tons.	Year.	Short tons.
1886.....	2, 340, 859	1893.....	3, 445, 995
1887.....	2, 695, 713	1894.....	2, 510, 808
1888.....	3, 524, 785	1895.....	1, 934, 914
1889.....	2, 840, 314	1896.....	2, 934, 711
1890.....	3, 021, 886	1897.....	2, 984, 834
1891.....	2, 754, 943	1898.....	3, 877, 678
1892.....	2, 291, 355	1899.....	3, 837, 736

CHICAGO, ILLINOIS.

The following tables are condensed from the statistical tables compiled by the Chicago Bureau of Coal Statistics and published in the *Black Diamond*. Anthracite receipts by lake fell off about 87,000 tons from 1898, but this was more than made up by an increase of over 392,000 tons in rail receipts. The total receipts of anthracite show a net gain of 305,696 tons.

Receipts of anthracite coal at Chicago in 1898 and 1899, by months.

Month.	Anthracite by lake.		Anthracite by rail.	
	1898.	1899.	1898.	1899.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
January			43, 066	87, 204
February			44, 478	85, 566
March.....			35, 681	84, 679
April.....	60, 798	4, 251	13, 468	89, 180
May.....	140, 260	142, 226	15, 763	37, 039
June.....	92, 772	174, 376	17, 979	25, 975
July.....	93, 551	128, 118	54, 499	45, 030
August.....	248, 304	153, 807	70, 633	73, 202
September.....	197, 546	140, 397	53, 637	121, 785
October.....	164, 779	223, 195	54, 107	106, 344
November.....	228, 143	180, 480	48, 449	67, 923
December.....	88, 193	80, 722	74, 752	95, 055
Total	1, 314, 346	1, 227, 572	526, 512	918, 982

Receipts of anthracite coal at Chicago in 1898 and 1899, by months—Continued.

Month.	Total anthracite.		1899.	
	1898.	1899.	Increase.	Decrease.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
January	43,066	87,204	44,138	.....
February	44,478	85,566	41,088	.....
March	35,681	84,679	48,998	.....
April	74,266	93,431	19,165	.....
May	156,023	179,265	23,242	.....
June	110,751	200,351	89,600	.....
July	148,050	173,148	25,098	.....
August	318,937	227,009	.....	91,928
September	251,183	262,182	10,999	.....
October	218,886	329,539	110,653	.....
November	276,592	248,403	.....	28,189
December	162,945	175,777	12,832	.....
Total	1,840,858	2,146,554	305,696	.....

The receipts of bituminous coal, practically all of which is by rail, together with the States from which shipped, is shown in the following table. A remarkable increase of 1,486,727 tons, or nearly 30 per cent, is exhibited. The greatest proportionate increase was from Ohio mines, the operators in that State seeming to have taken hold of Chicago markets with a fresh grip. The receipts from Ohio increased more than 125 per cent over 1898. Receipts from West Virginia and Kentucky increased 69 per cent; from Indiana, 25 per cent; from Pennsylvania, 25 per cent, and from Illinois, 20 per cent. Indiana shipped the largest increase tonnage into Chicago, with Illinois second. More than 70 per cent of the coal received in Chicago is from mines in Illinois and Indiana, and more than 40 per cent is from Illinois alone. Coke receipts fell off 408,335 tons, or nearly 40 per cent.

Receipts of bituminous coal and coke at Chicago for four years.

State from which received.	1896.	1897.	1898.	1899.	Increase in 1899.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Pennsylvania	184,655	211,158	410,801	^a 516,087	105,286
Ohio	330,837	813,632	240,592	550,157	309,565
West Virginia and Kentucky.	394,549	649,441	475,738	806,122	329,384
Illinois	2,589,737	2,628,384	2,275,118	2,618,309	343,191
Indiana	1,351,848	1,571,237	1,574,530	1,973,831	399,301
Total bituminous coal.	4,851,626	5,373,852	4,976,779	6,463,506	1,486,727
Coke	397,811	527,608	925,898	520,556	^b 408,335

^a Receipts by lake, included in this amount, were 75,277 tons.
^b Decrease.

MILWAUKEE, WISCONSIN.

Mr. William J. Langson, secretary of the chamber of commerce, has prepared the following statement of the coal trade of that city:

The coal trade of Milwaukee for 1899 surpassed the record of all previous years, notwithstanding the fact that the scarcity of lake tonnage materially curtailed the supply. Receipts by lake and rail for the year were 1,919,864 tons, an increase of 230,803 tons compared with the gross receipts of 1898. The arrivals by lake amounted to 1,775,767 net tons, consisting of 922,321 tons of anthracite or hard coal and 853,446 tons of bituminous or soft coal. Assuming the receipts by rail to have been all soft coal, the total receipts of the latter were equivalent to 997,543 tons.

A comparison of the lake receipts of hard and soft coal with 1898 shows an increase in the former of 154,171 tons and a decrease in the latter of 67,465 tons, making the net increase of arrivals by lake 86,706 tons.

While the total receipts of coal at Milwaukee in 1899 increased 230,803 tons and shipments by rail westward decreased 106,143 tons, the local yards were almost completely denuded of stocks before the opening of navigation, indicating a large increase in local consumption. Deducting from the total receipts the westward shipments, we have 1,346,149 tons, representing approximately the local consumption of coal at Milwaukee.

Total receipts of coal at Milwaukee, Wisconsin, for five years.

Kind.	1895.	1896.	1897.	1898.	1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Anthracite.....	853, 680	813, 487	645, 432	768, 150	922, 321
Bituminous.....	592, 743	774, 308	910, 376	920, 911	997, 543
Total.....	1, 446, 423	1, 587, 795	1, 555, 808	1, 689, 061	1, 919, 864

Deducting from the total receipts the amount forwarded westward by rail from this point shows that the local consumption of coal at Milwaukee in 1899 was approximately 1,346,149 tons.

A comparison of the receipts of coal at Milwaukee by decades with those of 1899 is interesting and is shown in the following table:

Growth of the coal trade of Milwaukee.

Year.	Receipts.
	<i>Short tons.</i>
1868.....	92, 992
1878.....	239, 667
1888.....	1, 122, 243
1898.....	1, 689, 061
1899.....	1, 919, 864

The tables following exhibit the details of receipts and shipments at Milwaukee for a series of years:

Receipts of coal at Milwaukee for six years.

Source.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
By lake from—						
Buffalo	658, 978	755, 831	745, 870	545, 219	624, 616	797, 006
Erie	97, 995	86, 332	19, 879	92, 370	134, 774	273, 779
Oswego.....	41, 891	33, 364	60, 309	38, 319	37, 000	2, 590
Cleveland	105, 800	105, 469	232, 689	305, 435	341, 898	354, 900
Ashtabula	58, 179	99, 521	114, 625	132, 103	115, 579	94, 284
Lorain.....	22, 552	27, 017	40, 460	13, 887	11, 855	24, 177
Sandusky	7, 250	5, 179	28, 238	42, 555	29, 572	27, 991
Toledo.....	90, 357	74, 603	114, 501	216, 318	243, 818	131, 047
Charlotte.....		1, 153			1, 275	613
Fairport.....	122, 573	126, 955	97, 532	44, 621	37, 094	38, 530
Ogdensburg	2, 065		2, 800		1, 133	
Huron, Ohio.....	3, 275	11, 229	29, 605	44, 378	4, 159	5, 400
Other ports.....	18, 395	9, 950	975	18, 323	4, 192	25, 450
Total, lake	1, 229, 310	1, 336, 603	1, 487, 483	1, 493, 528	1, 586, 965	1, 775, 767
By railroad.....	107, 736	109, 920	100, 312	62, 280	102, 096	144, 097
Receipts	1, 337, 046	1, 446, 423	1, 587, 795	1, 555, 808	1, 689, 061	1, 919, 864

Shipments of coal from Milwaukee for six years.

Shipped by—	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Chicago, Milwaukee and St. Paul Rwy.....	246, 620	398, 063	264, 650	362, 751	398, 668	327, 369
Chicago and Northwestern Rwy.....	167, 753	221, 257	169, 409	247, 979	245, 472	210, 495
Wisconsin Central R. R....	12, 377	17, 990	12, 318	42, 017	31, 538	35, 851
Lake	6, 018	3, 070	306	120	4, 130	
Total	432, 768	640, 470	446, 683	652, 867	679, 858	573, 715

Receipts of coal at Milwaukee by lake and rail annually from 1862 to 1899, inclusive.

Year.	Tons.	Year.	Tons.
1862.....	21, 860	1881.....	550, 027
1863.....	43, 215	1882.....	593, 842
1864.....	44, 503	1883.....	612, 584
1865.....	36, 369	1884.....	704, 166
1866.....	66, 616	1885.....	775, 750
1867.....	74, 568	1886.....	759, 681
1868.....	92, 992	1887.....	842, 979
1869.....	87, 690	1888.....	1, 122, 243
1870.....	122, 865	1889.....	980, 678
1871.....	175, 526	1890.....	996, 657
1872.....	210, 194	1891.....	1, 156, 033
1873.....	229, 784	1892.....	1, 374, 414
1874.....	177, 655	1893.....	1, 249, 732
1875.....	228, 674	1894.....	1, 337, 046
1876.....	188, 444	1895.....	1, 446, 423
1877.....	264, 784	1896.....	1, 587, 795
1878.....	239, 667	1897.....	1, 555, 808
1879.....	350, 840	1898.....	1, 689, 061
1880.....	368, 568	1899.....	1, 919, 864

Freight rates from Buffalo to upper lake ports in 1899.

Month.	Chicago.	Milwaukee.	Duluth and Superior.	Gladstone
April.....	\$0. 30	\$0. 30	\$0. 30	\$0. 30
May.....	\$0. 30 to . 50	\$0. 30 to . 50	. 30	\$0. 30 to . 40
June.....	. 50	. 50	\$0. 30 to . 40	. 40
July.....	. 50 to . 60	. 50 to . 60	. 40	. 40
August.....	. 60 to . 80	. 60 to . 80	. 40 to . 60	. 40 to . 60
September.....	. 80 to 1. 00	. 80 to 1. 00	. 60	. 60
October.....	. 75 to 1. 00	. 75 to 1. 00	. 50 to . 60	. 60
November to close..	. 75 to 1. 00	. 75 to 1. 00	.....	.....

Yard prices per ton of coal at Milwaukee during the year 1899, reported by R. P. Elmore Company.

Month.	House use.		Cannel.		Steam coal Ohio and Erie.
	Lackawana and Scranton.	Pocahontas.	Bird's-eye.	Butts.	
January	\$5. 50	\$4. 50	\$7. 50	\$6. 50	\$2. 75 to \$2. 90
February	\$5. 75 to 6. 50	\$4. 50 to 4. 75	7. 50	6. 50	2. 75 to 2. 90
March.....	6. 50	4. 75	7. 50	6. 50	2. 75 to 2. 90
April.....	6. 50	4. 75	7. 50	6. 50	2. 75 to 2. 90
May.....	6. 00	4. 75	7. 50	6. 50	2. 75 to 2. 90
June.....	6. 00	4. 75	7. 50	6. 50	2. 40 to 2. 65
July.....	6. 25	4. 75	7. 50	6. 50	2. 40 to 2. 65
August.....	6. 25	4. 75	7. 50	6. 50	3. 20 to 3. 35
September..	6. 75	4. 75	7. 50	6. 50	3. 45 to 3. 60
October	7. 00	5. 25	7. 50	6. 50	3. 45 to 3. 60
November ..	7. 00	5. 75	7. 50	6. 50	3. 95 to 4. 10
December ..	7. 00	5. 75	7. 50	6. 50	3. 95 to 4. 10

CINCINNATI, OHIO.

The Survey is indebted to Mr. Charles B. Murray, superintendent of the Chamber of Commerce, for the following review of the coal trade at Cincinnati:

Cincinnati is favorably situated with reference to supplies of coal from the Pittsburg and Kanawha districts, received by water and rail transportation, with also considerable quantities from Virginia and Ohio mines. The product is soft or bituminous coal, there being little consumption here of anthracite. In late years the West Virginia and Virginia mines have greatly advanced in importance in the resources for this market. The following tabulation indicates the quantities of coal separately received from the Pittsburg and Kanawha districts and from all other sources for the past ten years:

Receipts of coal at Cincinnati since 1890.

Year.	Pittsburg, by river.	Kanawha, by river.	Kanawha, by rail.	Total Kanawha.	All other kinds.	Total.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1890.....	42,601,000	19,221,000	2,000,000	21,221,000	4,166,000	67,988,000
1891.....	43,254,000	19,115,000	4,500,000	23,615,000	5,477,000	72,346,000
1892.....	42,272,000	19,215,000	9,300,000	28,515,000	6,072,000	76,859,000
1893.....	28,643,000	24,971,000	18,100,000	43,071,000	8,898,000	80,612,000
1894.....	40,157,000	16,398,000	13,300,000	29,698,000	6,603,000	76,458,000
1895.....	26,676,000	15,106,000	18,900,000	34,006,000	9,461,000	70,143,000
1896.....	36,697,000	22,015,000	13,800,000	35,815,000	7,177,000	79,689,000
1897.....	35,041,000	17,942,000	17,600,000	35,542,000	8,179,000	78,762,000
1898.....	41,271,000	19,949,000	15,900,000	35,849,000	6,823,000	83,943,000
1899.....	33,339,000	18,987,000	18,858,000	37,845,000	7,607,000	78,791,000

Since 1871 the receipts of coal at Cincinnati have been as follows:

Receipts of coal at Cincinnati since September 1, 1871.

Year.	Pittsburg (Youghiogheny).	Kanawha, by river.	Ohio River.	Canal.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1871-72.....	19,254,716	.....	^a 10,359,906	1,104,003
1872-73.....	24,962,373	.....	^a 11,075,072	1,162,052
1873-74.....	24,014,681	.....	^a 10,398,153	710,000
1874-75.....	24,225,002	4,476,619	4,277,327	565,352
1875-76.....	27,017,592	6,004,675	4,400,792	409,358
1876-77.....	28,237,572	3,631,823	5,141,150	322,171
1877-78.....	26,743,055	6,386,623	3,288,008	380,768
1878-79.....	20,769,027	6,134,039	4,068,452	333,549
1879-80.....	31,750,968	8,912,801	4,268,214	202,489
1880-81.....	23,202,084	10,715,459	3,151,934	67,684
1881-82.....	37,807,961	13,950,802	3,560,881	77,336
1882-83.....	33,895,064	13,260,347	3,309,534	180,621
1883-84.....	32,239,473	15,926,743	2,956,688	293,010
1884-85.....	32,286,133	14,588,573	3,007,078	314,774
1885-86.....	34,933,542	17,329,349	939,746	205,717
1886-87.....	37,701,094	20,167,875	338,435	129,503
1887-88.....	41,180,713	20,926,596	1,533,358	26,098
1888-89.....	36,677,974	23,761,853	544,940	12,129
1889-90.....	42,601,615	19,221,196	454,385	.....
1890-91.....	43,254,460	19,115,172	1,479,670	15,111
1891, 4 months ..	13,766,390	6,288,442	234,940	.....
1892 ^b	42,272,348	19,214,704	768,588	.....
1893.....	28,643,562	24,971,261	405,202	.....
1894.....	40,156,667	16,398,039	158,334	.....
1895.....	26,675,823	15,106,095	14,400	.....
1896.....	36,696,759	22,015,133	130,217	.....
1897.....	35,040,790	17,941,769	60,217	.....
1898.....	41,271,142	19,949,098	95,590	.....
1899.....	33,339,381	18,987,364	29,533	.....

^aIncluding Kanawha coal.

^bCalendar years since 1892.

Receipts of coal at Cincinnati since September 1, 1871—Continued.

Year.	Anthracite.	Other kinds.	Total.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1871-72.....	72, 171	.....	30, 790, 796
1872-73.....	75, 000	.....	37, 274, 497
1873-74.....	112, 000	.....	35, 234, 834
1874-75.....	248, 750	1, 597, 260	35, 390, 310
1875-76.....	282, 578	2, 068, 322	40, 183, 317
1876-77.....	376, 125	1, 913, 793	39, 622, 634
1877-78.....	439, 350	1, 654, 425	38, 892, 229
1878-79.....	768, 750	2, 136, 850	34, 210, 667
1879-80.....	712, 075	2, 351, 699	48, 198, 246
1880-81.....	770, 525	2, 336, 752	40, 244, 438
1881-82.....	779, 925	3, 090, 715	59, 267, 620
1882-83.....	977, 250	2, 997, 216	54, 620, 032
1883-84.....	1, 085, 350	3, 910, 795	56, 412, 059
1884-85.....	1, 257, 900	2, 683, 864	54, 138, 322
1885-86.....	1, 287, 925	2, 720, 250	57, 416, 529
1886-87.....	1, 314, 775	3, 693, 850	63, 345, 532
1887-88.....	1, 328, 225	5, 710, 649	70, 705, 639
1888-89.....	1, 020, 525	3, 075, 000	65, 092, 421
1889-90.....	1, 001, 175	4, 709, 775	67, 988, 146
1890-91.....	1, 118, 671	7, 362, 698	72, 345, 782
1891, 4 months.....	402, 528	4, 437, 139	25, 129, 439
1892 <i>a</i>	1, 268, 170	13, 335, 006	76, 858, 816
1893.....	759, 626	25, 832, 374	80, 612, 025
1894.....	661, 548	19, 083, 527	76, 458, 115
1895.....	1, 227, 000	27, 119, 823	70, 143, 141
1896.....	1, 171, 000	19, 676, 000	79, 689, 109
1897.....	1, 251, 250	24, 468, 000	78, 762, 026
1898.....	948, 125	21, 679, 000	83, 942, 955
1899.....	1, 291, 250	25, 144, 000	78, 791, 528

a Calendar year since 1892.

NOTE.—Since 1890-91 "Other kinds" represent Kanawha coal largely; in 1898, 15,885,000 bushels, or 73 per cent; in 1899, 18,858,000 bushels, or 75 per cent. (See preceding table.)

Prior to 1891 the rail receipts at Cincinnati did not reach as great a volume as 5,000,000 bushels in a year, except in one instance.

The arrivals of coal at Cincinnati in 1899 were reduced 5,151,000 bushels compared with the preceding year, the river receipts falling off 8,959,000 bushels, under low-water conditions covering a period of several months; the rail receipts were increased 3,808,000 bushels. Under advanced prices in the latter part of the year the general average cost, afloat and for delivered lots, was about 40 cents per ton above the preceding year, which represented the lowest of such records.

Coal consumption at Cincinnati in recent years has been something over 60,000,000 bushels annually. So far as can be judged by available information from dealers the quantity is pretty evenly divided between factory and household uses. About 5½ per cent of the supply is absorbed in the local manufacture of gas, the quantity thus consumed in 1899 being 3,300,000 bushels. The quantity of gas supplied during the year by the local company was 1,129,645,000 feet. The company having reduced the price for gas quite materially, especially for fuel purposes, it is to be expected that an enlarged quantity of coal will hereafter find consumption through this channel.

Standard lump coal was delivered to consumers early in the year, to some extent, at \$2.25 per ton, in the usual way, but \$2.50 prevailed most of the time until September, when the price was advanced to \$2.75, and subsequently to \$3.25. The general average for the year was \$2.64, against \$2.23 for the preceding year, and an annual average of \$2.37 for five years prior to 1899. For coal afloat in barges the price ranged from 4½ to 7 cents per bushel previous to November, with some transactions late in the year at 7½ and 8 cents. The year's general average was 5.30 cents for Pittsburg, and 5.58 cents for Kanawha, the former representing 63 per cent and the latter 37 per cent of the supply afloat; and the average for both was 5.40 cents against the same general average for 1898, equivalent to about \$1.50 per ton.

The yearly range and average prices of Pittsburg coal, afloat and delivered, per bushel, based on weekly records, compare for a series of years as shown in the following compilation:

Yearly range and average prices of Pittsburg coal at Cincinnati.

Year.	Afloat.			Delivered.		
	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
1885-86...	5½	8	6.58	9	11	10.05
1886-87...	6½	15	7.55	9½	16	11.04
1887-88...	7	18	10.01	10½	22	13.96
1888-89...	6	8½	6.71	9	11½	9.95
1889-90...	6	8	6.78	9	10½	9.69
1890-91...	6½	8½	7.28	10	10½	10.24
1892.....	6½	8½	7.49	9	12½	10.36
1893.....	6½	8½	7.58	9	19½	11.04
1894.....	5½	9	6.34	7½	10½	9.11
1895.....	5½	6½	6.00	8½	10½	9.00
1896.....	5½	6	5.73	8½	9	8.21
1897.....	5½	5½	5.70	5½	10½	8.10
1898.....	5	6	5.66	7½	9	8.05
1899.....	4½	7½	5.30	8½	11½	9.50

The bulk of coal from the Kanawha, Virginia and West Virginia region, sells at about the same prices as are obtained for the product from the Pittsburg district.

The receipts of coke for the year were 3,204,000 bushels, and the quantity locally manufactured was 3,981,000 bushels, making a total of 7,185,000 bushels, compared with 6,838,000 bushels the preceding year. For city manufacture the average price for the year was 8.25 cents per bushel; of gas house, 7.33 cents; of Connellsville, \$5.40 per ton.

ST. LOUIS, MISSOURI.

The following summary of the coal trade of St. Louis for the year 1899 is furnished by Mr. James Cox, secretary of the Business Men's League of that city.

In previous reviews of the coal trade of St. Louis stress has been laid on the fact that the average price of coal for steam-producing purposes is lower in St. Louis than in any other large city in the country. The city which has been selected for the holding of the Louisiana Purchase Centennial Exposition more than maintained its reputation in this regard during 1899. Standard Illinois lump coal sold as low as 95 cents during several months in the year, as compared with the minimum price of \$1.30 in 1898, a reduction of about 30 per cent. Prices stiffened somewhat during the early winter, and closed at \$1.15, as compared with \$1.35 in January of the same year. The year was one of phenomenal prosperity in commerce and manufactures, as is evinced by the great increase in the consumption of soft coal, which is used almost exclusively by factories. In 1899 the receipts for the year were 109,000,000 bushels in excess of the best preceding year, a clear gain of 10 per cent. Factories were active at all seasons, and in many lines of business overtime was made and a great deal of night work was done. This was particularly notable in all lines connected with iron and steel. Street-car factories were overwhelmed with orders throughout the year, and this has continued in 1900. Tobacco factories worked to full capacity, and there was an immense increase in the production of shoes. In almost every other line there was a marked gain, which is reflected in the coal business.

As in past years, the great bulk of the inexpensive coal used in St. Louis came from the southern Illinois coal fields. The Illinois Central Railroad Company hauled in one-fifth of the entire supply, or almost identically the same tonnage as in 1898. The Wabash, the Louisville and Nashville, and the Louisville, Evansville, and St. Louis railroads between them hauled in another one-fourth of the entire supply, as they did in 1898. The Baltimore and Ohio Southwestern Railroad brought in 13,600,000 bushels, as compared with 10,500,000 in 1898. The receipts from the Ohio River showed a considerable gain over last year, but

did not amount in the aggregate to a million bushels. The St. Louis and Iron Mountain Railroad, which has been hauling in about 100,000 tons of coal from points south of St. Louis, returns no business in this line at all for 1899, and the St. Louis and San Francisco Railroad, which reported 25,000 bushels in 1897, reports only the nominal business of 850 bushels for 1899. The Missouri Pacific, which has in past years hauled in considerable coal from the points west of St. Louis, only returns 11,500 bushels for 1899, as compared with 61,000 bushels in 1897.

These figures seem to indicate that the prevailing low prices in the southern Illinois coal field shut out competition.

Anthracite coal sold from \$5.70 to \$6.20 during the year. This is on an average rather higher than 1898, but the difference is not material. The gross receipts of anthracite in 1899 were 292,108 short tons. This is the largest return ever made for St. Louis, showing a gain of nearly 70,000 tons on 1898 and of 120,000 tons on 1897. Anthracite is being used much more generally in residences, but comparatively few firms find it profitable to substitute it for the much cheaper soft coal for commercial purposes. The heavy gain in the receipts of coke reported last year was not maintained, the total reported for 1899 being about a million bushels, of 40 pounds each, less than for the preceding year. This is largely accounted for by the fact that prices were considerably higher, especially in the cheaper varieties of coke, where there was an advance of 75 cents a ton.

The year ended with business active in every line, and the best prospects for increased demand. The following quotations show the range of prices during the year, the figures in each case being free on board St. Louis:

Coal prices at St. Louis, Missouri, during 1899.

Kind.	Highest.	Lowest.	Closing.
Standard Illinois lump coal	\$1. 60	\$0. 95	\$1. 15
High-grade Illinois lump coal.....	1. 87½	1. 37½	1. 87½
Anthracite, large.....	5. 95	5. 70	5. 95
Anthracite, small	6. 20	5. 95	6. 20
Connellsville coke.....	7. 15	3. 50	6. 65
New River coke.....	6. 90	3. 25	6. 30
Indiana coke.....	4. 00	3. 00	3. 00
Kentucky coke.....	3. 75	2. 75	3. 25
Gas coke	4. 00	3. 25	4. 00

The following table shows the receipts of coal and coke at St. Louis during the last nine years:

Coal and coke receipts at St. Louis since 1891.

Year.	Soft coal.	Hard coal.	Coke.
	<i>Bushels.</i>	<i>Tons.</i>	<i>Bushels.</i>
1891.....	72, 078, 225	139, 050	6, 924, 250
1892.....	82, 302, 228	187, 327	8, 914, 400
1893.....	87, 769, 375	173, 653	7, 807, 000
1894.....	74, 644, 375	186, 494	6, 365, 900
1895.....	88, 589, 935	207, 784	7, 130, 300
1896.....	87, 677, 600	218, 955	5, 395, 900
1897.....	83, 730, 980	172, 933	5, 671, 350
1898.....	83, 562, 450	225, 616	7, 762, 250
1899.....	103, 115, 730	292, 118	6, 795, 100

MOBILE, ALABAMA.

Mr. Edward E. England, secretary of the Chamber of Commerce, has prepared the following review of the coal trade at that port:

The receipts for a series of years have been as follows:

Receipts of coal at Mobile, Alabama, since 1883.

Year.	Alabama coal. (a)	Anthracite and English.	Total.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
1883.....	25, 304	1, 229	26, 533
1884.....	17, 808	891	18, 699
1885.....	40, 301	775	41, 076
1886.....	30, 310	2, 022	32, 332
1887.....	39, 232	910	40, 142
1888.....	38, 785	648	39, 433
1889.....	43, 620	1, 454	45, 074
1890.....	39, 320	1, 327	40, 647
1891.....	51, 267	1, 775	53, 042
1892.....	70, 298	1, 500	71, 798
1893.....	90, 000	4, 130	94, 130
1894.....	104, 340	3, 600	107, 940
1895.....	156, 996	4, 200	161, 196
1896.....	165, 000	3, 000	168, 000
1897.....	<i>b</i> 175, 160	1, 600	176, 760
1898.....	122, 500	4, 425	126, 925
1899.....	187, 300	<i>c</i> 2, 000	189, 300

a This does not include the amount of coal used by the railroads on their locomotives and at their shops.

b Includes 3,000 tons received by barges via Tombigbee River.

c Anthracite only.

As Alabama is the fifth largest coal-producing State in the Union, and as its production increased from 5,893,770 tons in 1897 to 7,484,783 tons in 1899, with an estimated production of 10,000,000 tons for 1900, it would seem that there will be not only a sufficient amount produced to supply all demand in the State, but a generous product for export. Such was the case up to within the past two years, but in that time Alabama had forged to the front as a great iron-producing State, and the tremendous demands for iron in all of its forms has given such an impetus to the iron industries as to cause an unprecedented demand for coal for coking purposes, and any surplus that previous years may have shown has vanished. The opening up of thousands of coke ovens has made necessary also the opening up of new coal mines in order to supply this increased demand for coal by the iron industry alone.

In addition to these, many large manufacturing plants have been erected within the past year, not only in Alabama but in sections of other States near the coal fields, and extensive additions have been made to old plants. All of these depend on Alabama coals for steam purposes, and have added largely to the State production. In Alabama alone 52 cotton mills are now in operation, with several new ones in course of erection, to be completed by October 1, 1900.

Another factor is the increased demand by railroads, made necessary not only on account of the building of new lines, but by the increased commerce extended to them from the different industries as well as from the general building up of the State.

Though the receipts at Mobile exceeded those of any previous year yet the bulk of the coal has been barely sufficient to supply the home demand, leaving only 4,770 tons to be applied to export orders, which orders have aggregated several hundred thousand tons. Outside of exporting coal Mobile's business consists largely in supplying steamers with bunker coal. This branch of the trade in the past year has shown a considerable increase, 372 steamers having entered the port of Mobile in six months.

Mobile is fast becoming a manufacturing city, and the increase of manufacturing industries has increased the demand for coal for steam purposes. The consumption of coal for domestic use has also grown materially, owing to the increased population. This is more clearly shown by the statement that in 1899 2,048 new buildings were erected, yet to-day there is not a desirable house or store for rent in the city. Prosperity is generally evident, and if there is or has been in the past two years a skilled or unskilled laborer idle in Mobile it is because he does not want work. The increase in foreign commerce is notable, the year ending June 30, 1900, showing \$16,000,000, as against less than \$10,000,000 for the same period in 1899, and as against \$2,832,690 for the year 1894.

With the increase of shipping, the increase of different manufacturing plants, and the steady growth of population, the receipts of coal at Mobile for 1900 will exceed those of 1899 by at least 30 per cent, and if the mines produce a surplus over and above that needed for State use, our export orders will easily take care of the surplus.

NORFOLK, VIRGINIA.

Col. William Lamb has furnished the following statement showing the shipments of coal from Lamberts Point piers.

Pocahontas coal shipments from Lamberts Point piers since 1890.

Year.	Foreign.	Bunkers.	Coastwise.	Local.	Total.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
1890....	37,723	102,755	941,019	71,010	1,152,507
1891....	27,997	135,112	1,215,028	90,606	1,468,743
1892....	25,653	129,627	1,400,984	98,034	1,654,298
1893....	84,969	125,688	1,512,931	100,453	1,774,041
1894....	44,328	105,382	1,810,480	96,841	2,057,031
1895....	34,174	75,714	1,430,144	100,442	1,640,474
1896....	41,600	99,867	1,433,069	96,929	1,671,465
1897....	44,103	104,966	1,473,710	115,079	1,737,858
1898....	200,283	107,154	1,450,943	131,422	1,889,802
1899....	207,649½	125,919½	1,497,297½	131,916	1,962,782

The large increase in foreign shipments in 1898 was attributed to the Spanish war and to coal-mining strikes in England. These causes were not operating in 1899, but in spite of that the statistics show an increase in foreign shipments of 7,500 tons, and in December the orders for foreign shipment exceeded the ability of the Norfolk and Western Railroad to supply the demand.

SAN FRANCISCO, CALIFORNIA.

Mr. J. W. Harrison, in his annual report to the coal trade of San Francisco, says:

It is singular to report a smaller consumption of coal this year than last, in view of the large quantity delivered to the Government transports and the general belief here that every branch of trade is brisk, which invariably leads to a large fuel demand. The consumption of oil as a steam producer is being enlarged monthly. Fully 90 per cent of the coal now consumed here is produced by our northern collieries, and is under the absolute control of but five local managers, who could establish prices within one week 25 per cent above ruling rates.

The following table of prices will show the half-yearly fluctuations of foreign coals for "spot" cargoes:

Half-yearly prices for coal at San Francisco in 1899.

Kind.	January.	July.	December.
Australian (gas)	\$7.00	\$7.25	\$7.50
English steam	7.25	7.50	8.50
Scotch splint.....	7.50	7.75	7.75
West Hartley.....	8.00	8.00	8.00

Coast coal at the close was: For Wellington, \$8; for Seattle, \$6; for Coos Bay, \$5.

The various sources from which we have derived our supplies are as follows:

Sources of coal consumed in California.

Source.	1890.	1891.	1892.	1893.	1894.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
British Columbia.....	441,759	652,657	554,600	588,527	647,110
Australia	194,725	321,197	314,280	202,017	211,733
English and Welsh.....	35,662	168,586	210,660	151,269	157,562
Scotch	1,610	31,840	24,900	18,809	18,636
Eastern (Cumberland and anthracite)	32,550	42,210	35,720	18,960	16,640
Franklin, Green River, Cedar River, etc	216,760	178,230	164,930	167,550	<i>a</i> 153,199
Carbon Hill, South Prairie, etc	191,109	196,750	218,390	261,435	241,974
Mount Diablo and Coos Bay	74,210	90,684	66,150	63,460	65,263
Japan, etc	13,170	20,679	4,220	7,758	<i>b</i> 15,637
Total.....	1,201,555	1,702,833	1,593,850	1,479,785	1,527,754

a Including Seattle.

b Including Alaska.

Sources of coal consumed in California—Continued.

Source.	1895.	1896.	1897.	1898.	1899.
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
British Columbia.....	651, 295	551, 852	558, 372	651, 208	623, 133
Australia	268, 960	273, 851	281, 666	201, 931	139, 333
English and Welsh....	201, 180	156, 368	107, 969	75, 115	93, 263
Scotch	4, 098	8, 356	4, 081	5, 056	38, 951
Eastern (Cumberland and anthracite)	26, 863	17, 907	21, 335	37, 560	271, 694
Seattle (Franklin, Green River, etc.)...	150, 888	128, 919	220, 175	283, 963	<i>None.</i>
Carbon Hill, South Prairie, etc	256, 267	255, 923	286, 205	348, 474	355, 756
Mount Diablo and Coos Bay	84, 954	110, 237	115, 150	172, 506	189, 507
Japan, Alaska, etc....	9, 015	2, 247	6, 587	26, 560	28, 390
Total	1, 653, 520	1, 505, 660	1, 601, 540	1, 802, 373	1, 740, 027

As it is necessary to include deliveries at Port Los Angeles and at San Diego to arrive at an accurate statement of the consumption of coal in the State, these are added in the above sources of supply. The total amount received by water at these two points aggregated 155,238 tons in 1897, 154,402 tons in 1898, and 184,747 tons in 1899.

Coke.—The total amount of coke received amounts to 31,091 tons, against 41,630 tons received last year. Three-fourths of the coke consumed here is imported from England and Belgium.

SEATTLE, WASHINGTON.

Mr. Lovett M. Wood, editor of the Trade Register, has furnished statistics of the coal movement at that port.

The coal trade of Seattle, that city being the most important coal market in the State, showed a substantial gain in 1899, as it has for several years past. The increasing population of Seattle and the State, noteworthy gains in coast and Asiatic commerce, and the fact that San Francisco finds it profitable and necessary to purchase Washington and other coast coals rather than foreign fuel, have been potent factors in giving greater activity to Washington mines.

During 1899 ten mines shipped their product to Seattle, the record being as follows:

Shipments of coal from the mines to Seattle in 1899.

Mine.	Tons.
Issaquah Coal Co.....	118,328
Black Diamond.....	227,254
Newcastle.....	113,710
Franklin.....	151,745
Renton Cooperative Co.....	38,938
Cedar Mountain.....	10,930
Sunset Coal Co.....	3,117
Over Northern Pacific R. R.....	79,802
Coal Creek <i>a</i>	41,142
Lawson <i>b</i>	36,399
Total.....	821,365

a Opened in February, 1899.

b Opened in May, 1899.

Receipts and exports of coal at Seattle, Washington, in 1899, by months.

Month.	Receipts.	Exports. <i>a</i>
	<i>Tons.</i>	<i>Tons.</i>
January.....	64,399	38,720
February.....	62,250	36,090
March.....	70,566	40,630
April.....	59,095	28,970
May.....	62,157	37,260
June.....	61,154	32,901
July.....	56,855	32,694
August.....	72,773	44,925
September.....	73,778	39,876
October.....	84,107	33,787
November.....	77,099	41,655
December.....	77,132	36,920
Total 1899.....	821,365	<i>b</i> 444,428
Total 1898.....	622,284	378,578
Increase in 1899.....	199,081	65,850

a Foreign and domestic points (mostly San Francisco, California).

b 16,400 tons to foreign.

The total receipts and exports for a series of years at Seattle were as follows:

Coal receipts at Seattle, Washington, 1889 to 1899.

Year.	Receipts.	Exports. ^a
	<i>Tons.</i>	<i>Tons.</i>
1889.....	369, 198	.....
1890.....	487, 215	.....
1891.....	421, 587	.....
1892.....	416, 174	.....
1893.....	461, 034	342, 114
1894.....	437, 939	318, 670
1895.....	363, 979	257, 739
1896.....	425, 103	194, 771
1897.....	472, 311	287, 883
1898.....	622, 284	378, 578
1899.....	821, 365	^b 444, 428

^a Foreign and to domestic points (mostly San Francisco, California).

^b 16,400 tons to foreign.

PRODUCTION OF COAL, BY STATES.

Including an insignificant product from Idaho and the Territory of Alaska, there were thirty States and Territories that contributed to the output in 1899, as in the preceding year. Of these thirty States nineteen produced over 1,000,000 tons each in 1899, seven had an output exceeding 5,000,000 tons each, four exceeded 10,000,000, and two—Pennsylvania and Illinois—exceeded 20,000,000 tons. As is well known by all familiar with the coal trade, Pennsylvania stands preeminently at the head of the coal-producing States. The combined output of anthracite and bituminous coal in Pennsylvania has for many years exceeded 50 per cent of the total output of the United States. The lowest percentage contributed by Pennsylvania in any of the years for which statistics are available was 52, in 1884 and 1888, while in 1880 it was as high as 65. In 1899, 53 per cent of the total product was from Pennsylvania mines; 29 per cent was Pennsylvania bituminous coal and 24 per cent Pennsylvania anthracite. With such a record it is not probable that Pennsylvania will be supplanted as the leading coal producer during the next fifty or one hundred years. It has been estimated that at the present rate of consumption the anthracite fields of Pennsylvania will last from one hundred and fifty to two hundred years. And while industrial activity does not affect anthracite operations as much as it does bituminous mines, the production and consumption is stimulated in seasons of business revival such as that which prevailed during the past year. Anthracite production in Pennsylvania in 1899 increased 13 per cent over 1898, as compared with an

increase of 13.8 per cent in Pennsylvania bituminous coal and a gain of 16 per cent in the total bituminous product of the United States. Anthracite coal is becoming more an article of domestic consumption every year, while its use under boilers and for manufacturing purposes is being supplanted to a large extent by soft coal. It is not to be expected that its production will increase in the same proportion as bituminous coal, but with our increasing urban population its use as a domestic fuel may continue to increase for at least some time to come. Nor is it possible to predict what the rate of increase, if any, is going to be, but it is probable that for the next fifty years at least 20 per cent of our total product will be made up of Pennsylvania anthracite. The State will continue as the leading coal producer for many years, if the history of the past may be taken as a basis for judging of the future.

Next in importance to Pennsylvania as a coal producer is Illinois, whose product in 1899 was 24,439,019 short tons, equivalent to 9.6 per cent of the total product, and a gain of nearly 6,000,000 tons over the State's output in 1898. West Virginia, the third State in importance as a coal producer, increased her output 15.3 per cent, from 16,700,999 short tons in 1898 to 19,252,995 short tons in 1899; and while this product in 1899 exceeded that of Illinois for 1898, the latter's increased output in 1899 continues the State in second place, with a lead of over 5,000,000 tons ahead of West Virginia. Ohio remains in undisputed possession of fourth place, with a product of 16,500,270 short tons in 1899, a gain of nearly 2,000,000 tons, or 13.6 per cent. Alabama remains as firmly fixed in fifth place, with a total of 7,593,416 short tons in 1899, against 6,535,283 tons in 1898, recording an increase for last year of over a million tons.

It will be observed that all of these five leading States are east of the Mississippi River, and all but one, Illinois, belong to the Appalachian system. The sixth State in importance is Indiana, also east of the Mississippi River. Iowa, the most important coal-producing State west of the river, is seventh in the list of all the States, having displaced Maryland in 1899. Following Iowa are, in order, Maryland, Colorado, and Kentucky, contending for supremacy, each with a product exceeding 4,500,000 tons and less than 5,000,000 tons.

Continuing the Mississippi River as a dividing line for a geographical distribution of the product between the eastern and western States, it is found that the production of the States east of the river produced 224,096,219 short tons, or 88.3 per cent of the total, in 1899, as against 193,793,334 short tons, or 84.3 per cent, in 1898. The western States produced 29,643,773 short tons, or 11.7 per cent, in 1899 and 26,181,333 short tons, or 15.7 per cent, in 1898. Subdividing the eastern division into northern and southern States by the Potomac and Ohio rivers, we find that the States north of the boundary produced 187,031,987 short

tons, or 73.7 per cent, in 1899, as compared with 161,575,292, or 65 per cent of the total, in 1898. The southern States produced 37,064,232 short tons, or 14.6 per cent of the total, in 1899, and 32,218,042, or 19 per cent, in 1898.

The percentage of increase in production of the three divisions from 1898 to 1899 was as follows: Northern, 15.80; southern, 15.04; western, 13.22.

The production in the several States and Territories in 1899 and preceding years is discussed with more detail in the following pages.

ALABAMA.

Total product in 1899, 7,593,416 short tons; spot value, \$8,256,462.

The production of coal in Alabama in 1899 exceeded that of the preceding year by 1,058,133 short tons, or 16.2 per cent. This increase in product, noteworthy in itself, was made comparatively insignificant by the increase in value, which advanced from \$4,932,776 in 1898 to \$8,256,462, a gain of \$3,323,686, or about 67 per cent. The operators in Alabama derived evident benefit from the "boom" in the iron trade, the average price per ton obtained for the product in 1899 being \$1.09, as against 75 cents in 1898. The improvement in price was noticed in all the more important producing counties, and was most pronounced in Jefferson County, where the price advanced from 69 cents in 1898 to \$1.08 in 1899. Jefferson County is the largest coal-producing county in the State, contributing about two-thirds of the State's total. The product in Jefferson County increased 15 per cent in 1899 over 1898, or in slightly less ratio than the total increase. The value of Jefferson County's product increased 81 per cent as compared with 67 per cent for the State. The price in Walker County increased from 80 cents in 1898 to 99 cents in 1899; in Bibb County the price advanced from 86 cents to \$1.14, and in Tuscaloosa County from 90 cents to \$1.23.

The tonnage won by machines in 1899 was less than that won by their use in 1898, although the number of machines in use increased from 37 to 53. In two instances where a small amount of machine-mined product was reported the machines were installed late in the year, one mine having its machine equipment in use only twenty days. One company reported that electric machines were being installed at the close of the year. Of the machines in use in 1899, 52 were driven by air and one by electricity. The one electric machine was of the "long-wall" pattern. Of the 52 air machines, 41 were "pick" or "punching" machines, 10 were chain breast machines, and 1 long-wall machine.

The few instances of labor disaffection occurring in Alabama mines did not affect the industry as a whole. Strikes occurred in 10 mines, throwing 1,255 men out of employment for an average of fifty-seven days. The total working time lost by the strikes amounted to 71,715 days, a little more than 2 per cent of the total working time made by

the 13,485 men employed in the mines. The average tonnage per day per man in 1899 was unusually large, being 2.57 as compared with 2.44 in 1898, and 2.38 in 1897.

In considering the distribution of the product for consumption, as shown in the following tables, allowance must be made for the fact that a considerable portion of the product included in the shipments is made into coke at ovens located at points distant from mines. The total amount of coal made into coke in Alabama is something more than double the amounts shown in the tables.

Coal product of Alabama in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bibb	4	771,264	2,992	27,437	9,198	810,891	\$701,049	\$0.86	257	1,104
Blount and Cullman	2	15,600	2,700	.....	.....	18,300	19,626	1.07	230	44
Etowah	2	4,384	1,500	.....	.....	5,884	6,259	1.06	166	21
Jefferson	31	2,834,360	44,098	84,762	1,241,370	4,204,590	2,921,411	.69	257	6,494
St. Clair	2	69,361	604	2,843	.....	72,808	52,196	.72	252	155
Shelby	7	63,361	3,995	1,631	.....	68,987	120,026	1.74	222	29
Tuscaloosa	10	140,782	11,099	4,450	82,623	238,954	215,467	.90	253	58
Walker	21	1,020,647	4,122	24,685	21,880	1,071,334	854,330	.80	226	2,067
Winston	3	7,069	1,466	.....	.....	8,535	7,412	.87	212	21
Small and unreported mines			35,000	.....	.....	35,000	35,000	.....	.....	.....
Total	82	4,926,828	107,576	145,808	1,355,071	6,535,283	4,932,776	.75	250	10,733

Coal product of Alabama in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bibb	5	890,029	2,052	30,182	.....	912,263	\$1,041,484	\$1.14	248	1,355
Blount and St. Clair	3	62,976	150	1,825	.....	64,951	54,565	.84	247	183
Cullman and Marion	2	20,395	25	.....	.....	20,420	22,566	1.10	150	105
Etowah	2	9,078	200	300	.....	9,578	10,215	1.07	227	28
Jefferson	41	2,238,255	34,598	105,244	2,500,599	4,878,696	5,289,676	1.08	251	7,720
Shelby	10	85,557	100	1,271	.....	86,928	152,046	1.75	198	354
Tuscaloosa	8	233,678	1,162	4,924	85,697	325,461	398,766	1.23	223	801
Walker	26	1,160,939	6,607	11,748	70,000	1,249,294	1,240,004	.99	214	2,900
Winston	3	10,705	100	20	.....	10,825	12,150	1.12	185	35
Small mines			35,000	.....	.....	35,000	35,000	.....	.....	.....
Total	100	4,701,612	79,994	155,514	2,656,296	7,593,416	8,256,462	1.09	238	13,481

Distribution of the coal product of Alabama from 1889 to 1899.

Year.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ploy- ees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889 ...		2,327,209	59,945	79,515	1,106,314	3,572,983	\$3,961,491	\$1.10	.....	6,975
1890 ...		2,487,983	84,578	88,952	1,428,896	4,090,409	4,202,469	1.08	217	10,691
1891 ...		2,882,813	91,456	100,180	1,745,352	4,759,781	5,087,596	1.07	268	9,302
1892 ...		3,122,075	37,843	135,627	2,283,767	5,529,312	5,788,898	1.05	271	10,075
1893 ...		3,536,985	59,599	96,412	1,443,989	5,136,985	5,096,792	.99	237	11,294
1894 ...		3,269,548	43,911	130,404	953,315	4,397,178	4,085,535	.98	238	10,859
1895 ...	64	3,610,433	272,551	137,021	1,673,770	5,693,775	5,126,822	.90	244	10,346
1896 ...	80	3,555,493	285,416	138,268	1,769,520	5,748,697	5,174,135	.90	248	9,894
1897 ...	78	4,543,597	86,790	126,187	1,137,196	5,893,770	5,192,085	.88	233	10,597
1898 ...	82	4,926,828	107,576	145,808	1,355,071	6,535,283	4,982,776	.75	250	10,733
1899 ...	100	4,701,612	79,994	155,514	2,656,296	7,593,416	8,256,462	1.09	238	13,481

Coal product of Alabama since 1895, by counties.

County.	1895.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Bibb	653,732	710,842	671,077	810,891	912,263	101,372	.....
Blount	62,400	32,760	37,350	18,300	(a)	.....	.....
Cullman		1,000	.....		b 20,420	2,120	.....
Etowah	900	3,080	3,168	5,684	9,578	3,694	.....
Jefferson	3,726,325	3,729,719	3,714,676	4,204,590	4,878,696	674,106	.....
St. Clair	30,806	33,368	67,584	72,808	c 64,951	.....	7,857
Shelby	52,754	52,923	84,673	68,967	86,928	17,941	.....
Tuscaloosa	208,117	205,223	234,488	238,954	325,461	86,507	.....
Walker	946,241	952,642	1,037,516	1,071,334	1,249,294	177,960	.....
Winston	4,500	2,140	8,238	8,535	10,825	2,290	.....
Small mines	8,000	25,000	35,000	35,000	35,000	.....	.....
Total	5,693,775	5,748,697	5,893,770	6,535,283	7,593,416	d 1,058,133	.....

a Included with St. Clair County.

b Includes product of Marion County.

c Includes product of Blount County.

d Net increase.

The production of Alabama since 1870 has been as follows :

Annual coal product of Alabama since 1870.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1870.....	13, 200				
1873.....	44, 800				
1874.....	50, 400				
1875.....	67, 200				
1876.....	112, 000				
1877.....	196, 000				
1878.....	224, 000				
1879.....	280, 000				
1880.....	380, 800				
1881.....	420, 000				
1882.....	896, 000				
1883.....	1, 568, 000				
1884.....	2, 240, 000				
1885.....	2, 492, 000				
1886.....	1, 800, 000	\$2, 574, 000	\$1. 43		
1887.....	1, 950, 000	2, 535, 000	1. 30		
1888.....	2, 900, 000	3, 335, 000	1. 15		
1889.....	3, 572, 983	3, 961, 491	1. 10	248	6, 975
1890.....	4, 090, 409	4, 202, 469	1. 03	217	10, 642
1891.....	4, 759, 781	5, 087, 596	1. 07	268	9, 302
1892.....	5, 529, 312	5, 788, 898	1. 05	271	10, 075
1893.....	5, 136, 935	5, 096, 792	. 99	237	11, 294
1894.....	4, 397, 178	4, 085, 535	. 93	238	10, 859
1895.....	5, 693, 775	5, 126, 822	. 90	244	10, 346
1896.....	5, 748, 697	5, 174, 135	. 90	248	9, 894
1897.....	5, 893, 770	5, 192, 085	. 88	233	10, 597
1898.....	6, 535, 283	4, 932, 776	. 75	250	10, 733
1899.....	7, 593, 416	8, 256, 462	1. 09	238	13, 481

ARKANSAS.

Total product in 1899, 843,554 short tons; spot value, \$989,383.

Compared with 1898, the coal product of Arkansas in 1899 exhibits a decrease of 361,925 short tons, with a falling off of \$249,395 in value. This was the only instance worthy of note in which the product of last year was less than that of 1898. There were small decreases in the production of Alaska, Idaho, and Georgia, but the aggregate losses in those States did not amount to 20,000 tons. The decrease in

the output of Arkansas was due, not to any falling off in demand, but to strikes in the principal mines. Out of the 22 mines in the State, 11 had men on strike from 30 to 180 days. The 11 mines affected employed 2,195 men out of a total of 2,313 in the State. The total working time lost by the strikes was 220,105 days, an average of 100 idle days for each, and equal to 61 per cent of the total working time made, from which it can be calculated that but for the time lost by strikes, the product of the State would have been about 1,350,000 tons, all other conditions being equal. Some of the miners of the Indian Territory were also on strike during the year, but in spite of that, the Territory increased its production by over 150,000 tons. This was not sufficient to supply the loss borne by Arkansas, the coal to supply the markets naturally fed by Arkansas being brought principally from Alabama.

In the following tables are presented the statistics of production in Arkansas, by counties, for the past two years:

Coal product of Arkansas in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.				
Franklin	7	318,842	1,435	8,135	328,412	\$397,933	\$1.21	127	892
Johnson									
Pope									
Sebastian	10	848,261	5,821	16,985	871,067	828,845	.95	182	1,663
Small mines									
Total	17	1,167,103	13,256	25,120	1,206,479	1,238,778	1.03	163	2,555

Coal product of Arkansas in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.				
Franklin	5	230,276	1,385	7,835	239,496	\$290,114	\$1.21	181	635
Johnson									
Logan									
Pope	3	14,050	2,050	1,600	17,700	51,000	2.90	74	147
Sebastian	14	567,040	861	12,457	580,358	636,269	1.10	153	1,531
Small mines									
Total	22	811,366	10,296	21,892	843,554	989,383	1.17	156	2,313

Distribution of the coal product of Arkansas from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.				
1889.....		268,518	6,820	4,246	279,584	\$395,836	\$1.42	.....	677
1890.....		374,969	9,240	15,679	399,888	514,595	1.29	214	938
1891.....		518,120	8,909	15,350	542,379	647,560	1.19	214	1,317
1892.....		513,908	7,450	14,200	535,558	666,230	1.24	199	1,128
1893.....		549,504	11,778	13,481	574,763	773,347	1.34	151	1,559
1894.....	13	488,077	7,870	16,679	512,626	631,988	1.22	134	1,493
1895.....	13	576,112	14,935	7,275	598,322	751,156	1.25	176	1,218
1896.....	14	647,240	8,640	19,494	675,374	755,577	1.12	168	1,507
1897.....	14	827,518	11,568	18,084	856,190	903,993	1.06	156	1,990
1898.....	17	1,167,103	13,256	25,120	1,205,479	1,238,778	1.03	163	2,555
1899.....	22	811,366	10,296	21,892	843,554	989,383	1.17	156	2,313

According to the Tenth United States Census, the coal product of Arkansas in 1880 was 14,778 short tons, valued at \$33,535. No statistics were obtained in 1881. With this exception the statistics of production since 1880 have been as follows:

Annual production of coal in Arkansas since 1880.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1880.....	14,778	\$33,535	.....	.....	.....
1882.....	5,000	.....	.....	.....	.....
1883.....	50,000	.....	.....	.....	.....
1884.....	75,000	.....	.....	.....	.....
1885.....	100,000	.....	.....	.....	.....
1886.....	125,000	200,000	\$1.60	.....	.....
1887.....	129,600	194,400	1.50	.....	.....
1888.....	276,871	415,306	1.50	.....	978
1889.....	279,584	395,836	1.42	.....	677
1890.....	399,888	514,595	1.29	214	938
1891.....	542,379	647,560	1.19	214	1,317
1892.....	535,558	666,230	1.24	199	1,128
1893.....	574,763	773,347	1.34	151	1,559
1894.....	512,626	631,988	1.22	134	1,493
1895.....	598,322	751,156	1.25	176	1,218
1896.....	675,374	755,577	1.12	168	1,507
1897.....	856,190	903,993	1.06	156	1,990
1898.....	1,205,479	1,238,778	1.03	163	2,555
1899.....	843,554	989,383	1.17	156	2,313

MINERAL RESOURCES.

Coal product of Arkansas since 1895, by counties.

County.	1895.	1896.	1897.	1898.	1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Franklin	252, 938	222, 711	281, 299	328, 412	257, 196	71, 216
Johnson						
Pope						
Sebastian	339, 384	446, 663	568, 891	871, 067	580, 358	290, 709
Small mines ..	6, 000	6, 000	6, 000	6, 000	6, 000	.....
Total	598, 322	675, 374	856, 190	1, 205, 479	843, 554	361, 925

CALIFORNIA.

Total product in 1899, 160,715 short tons; spot value, \$428,333

In 1899, as in 1898, the coal product of California reached its maximum figure. The product in 1898 was about 70 per cent more than that of 1897. The output in 1899 was only about 11 per cent over that of 1898. It is not to be expected that California will ever become of any importance as a coal producer, but any increase in the domestic supply is of importance to the consumers in the State, as it has the tendency to lower prices of the imported fuel upon which the people have largely to depend. On the other hand, higher prices for imported coal stimulate domestic production, and as prices for the past two years have been advanced about 20 per cent encouragement has been given to the State mines.

Coal product of California in 1898, by counties.

County.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Alameda and Amador	2	77, 000	13, 200	.....	90, 200	\$205, 600	\$2. 28	292	145
Contra Costa, Kern, Orange, and Riverside ..	4	46, 568	2, 796	4, 724	54, 088	144, 315	2. 67	238	139
Total	6	123, 568	15, 996	4, 724	144, 288	349, 915	2. 43	265	284

Coal product of California in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Alameda, Alameda, and Contra Costa	3	147,641	137	4,432	152,210	\$406,771	\$2.67	292	345
Kern, Orange, and Riverside	3	3,400	5,106	.....	8,506	21,562	2.54	272	18
Total	6	151,041	5,242	4,432	160,715	428,333	2.67	291	363

Distribution of the coal product of California from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889		111,128	3,146	7,546	121,820	\$288,232	\$2.37	.....	.....
1890		103,436	2,121	5,154	110,711	283,019	2.56	301	364
1891		86,783	3,424	3,094	93,301	204,902	2.20	222	256
1892		73,269	9,679	2,230	85,178	209,711	2.46	204	187
1893		64,733	5,336	2,534	72,603	167,555	2.31	208	158
1894	6	52,736	8,143	6,368	67,247	155,620	2.31	232	125
1895	5	60,440	12,171	2,842	75,453	175,778	2.33	262	190
1896	4	69,608	4,537	4,399	78,544	166,123	2.12	297	157
1897	7	74,762	6,869	4,361	85,992	201,236	2.34	150	363
1898	6	123,568	15,996	4,724	144,288	349,915	2.43	265	284
1899	6	151,041	5,242	4,432	160,715	428,333	2.67	291	363

MINERAL RESOURCES.

Coal product of California since 1883.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1883.....	76,162	.....	.....	.....	.....
1884.....	77,485	.....	.....	.....	.....
1885.....	71,615	.....	.....	.....	.....
1886.....	100,000	\$300,000	\$3.00	.....	.....
1887.....	50,000	150,000	3.00	.....	.....
1888.....	95,000	380,000	4.00	.....	.....
1889.....	121,820	288,232	2.36	.....	.....
1890.....	110,711	283,019	2.56	301	364
1891.....	93,301	204,902	2.20	222	256
1892.....	85,178	209,711	2.46	204	187
1893.....	72,603	167,555	2.31	208	158
1894.....	67,247	155,620	2.31	232	125
1895.....	75,453	175,778	2.33	262	190
1896.....	78,544	166,123	2.12	297	157
1897.....	85,992	201,236	2.34	150	363
1898.....	144,288	349,915	2.43	265	284
1899.....	160,715	428,333	2.67	291	363

COLORADO.

Total product in 1899, 4,776,224 short tons; spot value, \$5,363,667.

Compared with 1898, the coal product of Colorado in 1899 increased practically 700,000 short tons, and as compared with 1893, the year of previous maximum production, there was an increase of over 670,000 short tons. There was a marked increase in the use of mining machines in 1899. The number of machines in use increased from 43 to 63, and the amount of coal mined by them from 225,646 tons to 527,115 tons. Of the machines in use in 1899, 29 were driven by electricity. One of these was a shearing machine and 28 were chain under-cutters. Thirty-four machines used air as a motive power, and of these 31 were of the type known as pick machines and 3 were chain cutters.

Two small mines in the State were idle practically throughout the entire year on account of labor troubles. Short-timed strikes occurred in 7 other mines, involving altogether 504 men for an average of 44 days. These did not have any material effect on the production.

The details of production by counties for the past two years are exhibited in the following tables:

Coal product of Colorado in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Boulder	17	387,919	30,345	33,275	.....	451,539	\$607,377	\$1.35	145	1,067
Delta	4	140	4,742	170	.....	5,062	6,560	1.30	221	10
Fremont	7	404,884	5,290	16,379	.....	426,553	682,583	1.60	154	1,045
Garfield	6	205,999	7,910	8,571	.....	222,480	234,554	1.05	224	345
Gunnison	5	193,643	8,588	5,185	115,905	323,321	417,607	1.29	252	477
Huerfano	14	931,023	6,383	36,258	102,217	1,075,881	1,185,244	1.10	275	1,452
Jefferson	3	.....	12,006	360	.....	12,366	25,536	2.07	223	27
La Plata	9	90,490	10,160	.....	.....	100,650	147,152	1.46	245	165
Las Animas	9	820,579	21,691	14,778	354,292	1,211,340	1,100,022	.91	255	1,465
Pitkin	3	70,016	912	1,436	123,132	195,496	210,376	1.08	286	198
Rio Blanco	4	.....	1,821	20	.....	1,841	2,606	1.94	104	8
Routt	7	.....	1,339	.....	.....	1,339	2,012	1.50	91	11
Weld	7	6,383	17,352	400	.....	24,085	34,000	1.41	214	68
Arapahoe	3	12,650	576	988	.....	14,214	14,942	1.06	91	59
El Paso										
Larimer										
Mesa										
Montezuma	3	9,000	1,690	.....	.....	10,690	15,510	1.45	121	43
Montrose										
Total	101	3,182,676	180,805	117,820	695,546	4,076,347	4,686,081	1.15	220	6,440

Coal product of Colorado in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Boulder	15	515,709	7,116	17,650	.....	540,475	\$719,836	\$1.33	190	862
Delta	3	1,200	4,657	243	.....	6,100	8,400	1.38	283	12
El Paso	3	27,668	.....	.....	.....	27,668	33,937	1.23	131	93
Fremont	6	592,582	8,174	19,853	.....	620,609	981,722	1.58	236	1,258
Garfield	8	129,725	1,989	2,640	.....	134,354	149,447	1.11	158	275
Gunnison	7	202,738	14,110	5,776	96,810	319,434	444,353	1.39	234	498
Huerfano	13	590,845	4,185	37,547	.....	632,577	727,781	1.15	238	1,240
Jefferson	3	.....	9,900	.....	.....	9,900	19,075	1.93	259	18
La Plata	6	112,672	3,770	58	.....	116,500	161,728	1.39	227	160
Las Animas	14	1,435,931	21,523	20,079	647,610	2,125,143	1,863,876	.88	296	2,408
Routt	7	300	911	.....	.....	1,211	1,742	1.44	83	11
Weld	12	9,779	36,384	1,410	.....	47,573	69,032	1.45	239	110
Arapahoe	2	.....	2,936	.....	.....	2,936	4,295	1.46	167	11
Larimer										
Mesa	4	17,072	500	.....	.....	17,572	26,910	1.53	256	18
Montezuma										
Montrose	5	45,120	1,998	1,732	125,322	174,172	151,533	.87	222	192
Pitkin										
Rio Blanco	5	45,120	1,998	1,732	125,322	174,172	151,533	.87	222	192
Total	108	3,681,341	118,153	106,988	869,742	4,776,224	5,363,667	1.12	246	7,166

MINERAL RESOURCES.

Distribution of the coal product of Colorado from 1889 to 1899.

Year.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Aver- age num- ber of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889		2,109,335	91,248	88,537	308,061	2,597,181	\$3,993,768	\$1.54	.....	4,904
1890		2,636,939	65,432	48,451	343,181	3,094,003	4,344,196	1.40	.....	5,827
1891		2,934,332	70,000	50,000	458,300	3,512,632	4,800,000	1.37	.....	6,000
1892		2,938,980	126,748	55,721	389,381	3,510,830	5,685,112	1.62	229	5,747
1893		3,345,951	65,386	178,993	512,059	4,102,389	5,104,602	1.24	188	7,202
1894 ...	79	2,181,048	56,688	112,414	481,259	2,831,409	3,516,340	1.24	155	6,507
1895 ...	87	2,445,578	49,088	99,055	489,261	3,082,982	3,675,185	1.20	182	6,125
1896 ...	88	2,424,027	65,755	93,128	529,490	3,112,400	3,606,642	1.16	172	6,704
1897 ...	97	2,649,042	76,699	93,782	542,180	3,361,703	3,947,186	1.17	180	5,852
1898 ...	101	3,132,676	130,305	117,820	695,546	4,076,347	4,686,081	1.15	220	6,440
1899 ...	108	3,681,341	118,153	106,988	869,742	4,776,224	5,363,667	1.12	246	7,166

Coal product of Colorado since 1895, by counties.

County.	1895.	1896.	1897.	1898.	1899	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Boulder	377,395	448,706	477,790	451,539	540,475	88,936	.....
Fremont	315,344	294,822	304,589	426,553	620,609	194,056	.....
Garfield	274,271	165,797	182,884	222,480	134,354	.....	88,126
Gunnison	239,182	260,596	297,417	323,321	319,434	.....	3,887
Huerfano	366,696	353,338	367,894	1,075,881	632,577	.....	443,304
Jefferson .....	.....	.....	10,445	12,366	9,900	.....	2,466
Las Animas	1,253,149	1,261,555	1,427,526	1,211,340	2,125,143	913,803	.....
La Plata	106,099	104,661	76,788	100,650	116,500	15,850	.....
Pitkin .....	.....	168,413	171,111	195,496	^a 174,172	.....	21,324
Weld	27,934	4,300	8,310	24,085	47,573	23,488	.....
Other counties ..	102,912	50,212	36,949	32,636	55,487	22,851	.....
Total	3,082,982	3,112,400	3,361,703	4,076,347	4,776,224	^b 699,877	.....

^a Includes Rio Blanco County.^b Net increase.

Coal product of Colorado since 1864.

Year.	Short tons.	Year.	Short tons.
1864.....	500	1882.....	1,061,479
1865.....	1,200	1883.....	1,229,593
1866.....	6,400	1884.....	1,130,024
1867.....	17,000	1885.....	1,356,062
1868.....	10,500	1886.....	1,368,338
1869.....	8,000	1887.....	1,791,735
1870.....	13,500	1888.....	2,185,477
1871.....	15,600	1889.....	2,597,181
1872.....	68,540	1890.....	3,077,003
1873.....	69,997	1891.....	3,512,632
1874.....	77,372	1892.....	3,510,830
1875.....	98,838	1893.....	4,102,289
1876.....	117,666	1894.....	2,831,409
1877.....	160,000	1895.....	3,082,982
1878.....	200,630	1896.....	3,112,400
1879.....	322,732	1897.....	3,361,703
1880.....	437,005	1898.....	4,076,347
1881.....	706,744	1899.....	4,776,224

GEORGIA.

Total product in 1899, 233,111 short tons; spot value, \$233,344.

There was a slight falling off in Georgia's tonnage in 1899, the product being 11,076 tons less than in 1898, but in spite of the decreased output there was a substantial gain in the value. The amount received by the operators for their product in 1899 exceeded the value of the 1898 product by \$35,175, and the average price per ton advanced from 81 cents to \$1, so that in revenue, if not in tonnage, the two companies in the State reaped the benefit of the improved trade conditions. The number of men employed in the mines and the average working time in 1899 were both more than in the preceding year, and under ordinary circumstances this should mean increased tonnage. The mining labor, however, is composed largely of State convicts, and the inference to be drawn is that the standard of efficiency in 1899 was lower by several degrees than that of 1898.

The statistics of production during the past eleven years is shown in the following table:

Coal product of Georgia since 1889.

Year.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
1889.....	46,131	158	15,000	164,645	225,934	\$338,901	\$1.50		
1890.....	57,949			170,388	228,337	238,315	1.04	313	425
1891.....	15,000	1,000	5,000	150,000	171,000	256,500	1.50	312	850
1892.....	52,614	250	3,756	158,878	215,498	212,761	.99	277	467
1893.....	196,227		4,869	171,644	372,740	365,972	.98	342	736
1894.....	178,610		8,978	166,523	354,111	299,290	.85	304	729
1895.....	135,692	150	6,256	118,900	260,998	215,863	.83	312	a 848
1896.....	120,496	875	7,520	109,655	238,546	168,050	.70	303	b 713
1897.....	120,398	1,481	5,500	68,490	195,869	140,466	.72	304	c 469
1898.....	135,926	890	5,650	101,721	244,187	198,169	.81	298	d 504
1899.....	149,954	440	6,150	76,567	233,111	233,344	1.00	302	e 567

a Includes 500 State convicts.

c Includes 300 State convicts.

b Includes 360 State convicts.

d All convict labor.

e Includes 125 convicts.

The following table shows the total annual product since 1884:

Coal product of Georgia since 1884.

Year.	Short tons.	Year.	Short tons.
1884.....	150,000	1892.....	215,498
1885.....	150,000	1893.....	372,740
1886.....	223,000	1894.....	354,111
1887.....	313,715	1895.....	260,998
1888.....	180,000	1896.....	238,546
1889.....	225,934	1897.....	195,869
1890.....	228,337	1898.....	244,187
1891.....	171,000	1899.....	233,111

ILLINOIS.

Total product in 1899, 24,439,019 short tons; spot value, \$20,744,553.

In 1899 the Geological Survey for the first time attempted the collection of the statistics of coal production in Illinois. Heretofore the statistics for Illinois have been taken from the reports of the State Bureau of Labor Statistics. The State bureau, however, compiles its reports for the fiscal year ending June 30, and it has been thought advisable, in order that better comparisons could be made with other States, to secure if possible the statistics of Illinois for the calendar year and uniform with the other features of this report. Considering that this was the first attempt the results were satisfactory. Reports were received from nearly every one of the commercial mines, and in the few instances where such reports were not received, the figures have been taken as reported for the fiscal year in the State report. More difficulty was encountered in securing reports from country banks. The production of most of these has been taken from the State report, and as the production from these varies very little from year to year, and is not influenced to any extent by business revivals or depressions, the difference between the tonnage of the fiscal year and that of the calendar year would be insignificant.

The Survey's compilation, with the estimates mentioned, shows the coal product of Illinois in 1899 to have been 24,439,019 short tons, almost an even million tons over the 23,434,445 tons given for the fiscal year in the State report. The value shows an increase of nearly \$2,300,000 over the value given in the State report, and an advance from 79 cents to 85 cents in the average price for the year. These figures indicate that in the latter half of 1899 there was more demand for Illinois coal than during the last six months of 1898, and that the improvement in prices was principally shown in the latter part of 1899.

Taking the Survey figures for 1899, and comparing the production with that of the fiscal year 1898, an increase in product of 5,839,720 short tons, or over 31 per cent, is shown; while the value exhibits a gain of \$6,176,955, equivalent to 42 per cent.

The effects of the settlement of the labor troubles are shown in the fact that the average time made by each miner and laborer in 1899 was 228 days, against 175 days in 1898. The number of employees increased from 35,026 to 36,756. The tonnage won by use of under-cutting machines increased from 3,415,635 to 6,085,312.

The details of production in 1899 were as follows:

Coal product of Illinois in 1899, by counties.

County.	Num- ber of mines.	Loaded at mines for shipment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bond	1	100,955			100,955	\$57,842	\$0.57	178	181
Brown	2		2,630		2,630	3,945	1.50	91	30
Bureau	12	1,291,007	60,638	49,263	1,400,908	1,671,104	1.19	227	3,565
Calhoun	1		6,113		6,113	9,170	1.50	272	17
Cass	2		3,430		3,430	5,490	1.60	194	20
Christian	6	547,218	49,386	20,423	617,027	469,183	.76	161	928
Clinton	5	582,738	22,819	21,897	577,454	413,216	.72	234	760
Fulton	29	586,787	53,745	11,162	651,694	614,739	.94	194	1,126
Gallatin	5	10,728	5,833	275	16,836	16,289	.97	163	52
Greene	5	1,728	13,692		15,420	22,800	1.48	211	48
Grundy	19	1,182,837	47,658	26,597	1,257,092	1,426,803	1.14	253	2,703
Hamilton	1		640		640	900	1.40	71	11
Hancock	2		5,498		5,498	7,862	1.43	186	26
Henry	21	45,972	45,991	466	92,429	140,431	1.52	291	209
Jackson	12	694,282	79,584	34,474	808,340	652,939	.81	200	1,053
Jefferson	1	61,265	800	945	63,010	63,010	1.00	210	83
Jersey	2		4,050		4,050	6,075	1.50	150	20
Johnson	1	1,080	2,501	10	3,541	2,751	.78	124	19
Kankakee	2	121,164	3,854	4,244	129,262	127,932	.99	248	207
Knox	11		55,820	104	55,924	74,613	1.33	185	180
La Salle	23	1,736,624	234,083	44,597	2,015,304	1,991,741	.99	255	3,440
Livingston	12	67,890	54,125	7,469	129,484	147,986	1.14	197	267
Logan	3	147,654	37,176	650	185,480	187,825	1.01	209	249
McDonough	8	20,059	22,160	50	42,269	56,743	1.34	129	275
McLean	5	165,724	8,087	12,676	186,487	245,209	1.31	254	421
Macon	3	77,345	73,058		150,403	169,907	1.13	221	532
Macoupin	15	1,629,811	49,806	47,485	1,727,102	1,243,388	.72	211	2,039
Madison	15	1,432,069	58,765	47,215	1,538,049	1,057,975	.69	252	1,350
Marion	6	653,938	29,695	26,854	710,487	475,081	.67	226	955
Marshall	4	322,627	17,305	10,800	350,732	378,606	1.08	275	764
Menard	9	371,256	29,935	31,757	432,948	362,030	.84	214	531
Mercer	14	450,120	36,368	16,986	503,474	570,218	1.13	233	781
Montgomery ..	6	288,374	9,120	3,930	301,424	186,615	.62	263	399
Morgan	2		4,500	6	4,506	6,759	1.50	250	14
Peoria	43	671,781	111,204	9,254	792,239	708,682	.89	234	1,264
Perry	21	769,095	31,990	8,340	809,425	487,437	.60	200	1,153
Randolph	11	387,676	43,366	5,992	437,034	303,522	.69	227	592
Rock Island ..	13		43,177	828	44,005	69,436	1.58	158	154
St. Clair	59	1,866,420	159,977	52,956	2,079,353	1,381,534	.66	219	2,325
Saline	4	88,243	7,100	393	95,736	73,176	.76	231	174
Sangamon	26	2,133,926	115,940	39,842	2,289,708	1,790,742	.78	229	2,793
Schuyler	6		15,874		15,874	17,996	1.13	221	41
Scott	2	18,765	2,962	500	22,227	27,979	1.26	283	55
Shelby	4	79,057	20,352	6,000	105,409	118,490	1.12	207	154
Stark	11	515	24,375	540	25,430	34,206	1.35	192	83
Tazewell	11	80,491	17,351	250	98,092	88,645	.90	208	200
Vermillion	45	2,032,274	130,775	28,018	2,191,067	1,677,004	.77	244	2,549
Warren	6		16,892	100	16,992	26,894	1.58	204	58
Washington ..	4	28,000	3,960	400	32,360	27,213	.84	175	87
Will	3	32,368	6,309	3,598	42,275	59,524	1.41	252	131
Williamson	14	990,952	43,487	37,928	1,072,367	779,316	.78	223	1,350
Woodford	2	151,165	12,559	15,300	179,024	205,590	1.15	248	438
Total	550	21,871,930	1,936,515	630,574	24,439,019	20,744,563	.85	228	36,756

Coal product of Illinois in 1896, 1897, 1898, and 1899, by counties.

County	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Bond.....	71,058	104,256	96,314	100,955	4,641	
Brown.....		1,760	1,940	2,630	690	
Bureau.....	1,042,304	1,145,312	865,892	1,400,908	535,016	
Calhoun.....	6,000	3,868	4,893	6,113	1,220	
Case.....	8,612	4,536	2,900	3,430	530	
Christian.....	763,228	837,897	495,616	617,027	121,411	
Clinton.....	309,504	328,184	417,584	577,454	159,870	
Fulton.....	516,349	469,034	563,397	651,694	88,297	
Gallatin.....	26,350	19,945	16,812	16,836	24	
Greene.....	8,270	7,200	8,520	15,420	6,900	
Grundy.....	1,247,394	1,077,576	796,249	1,257,092	460,843	
Hamilton.....	1,000	760	4,882	640		4,242
Hancock.....	4,497	4,160	5,600	5,498		102
Henry.....	136,415	119,497	159,049	92,429		66,620
Jackson.....	771,384	675,212	911,194	808,340		102,854
Jefferson.....	10,100	51,355	46,060	63,010	16,950	
Jersey.....	a 2,325		1,680	4,050	2,370	
Johnson.....	1,250	2,778	2,030	3,541	1,511	
Kankakee.....	72,395	180,683	84,632	129,262	44,630	
Knox.....	39,557	41,773	49,819	55,924	6,105	
Lasalle.....	1,409,085	1,508,833	1,165,490	2,015,304	849,814	
Livingston.....	218,953	145,206	122,087	129,484	7,397	
Logan.....	166,000	168,917	177,935	185,480	7,545	
McDonough.....	47,821	40,532	77,696	42,269		35,427
McLean.....	156,891	153,334	171,594	186,487	14,893	
Macon.....	188,207	173,163	300,264	150,403		149,861
Macoupin.....	2,097,539	1,975,981	1,264,926	1,727,102	462,176	
Madison.....	1,080,718	780,921	630,769	1,538,049	907,280	
Marion.....	643,561	626,850	714,513	710,487		4,026
Marshall.....	389,429	339,820	286,365	350,732	64,367	
Menard.....	347,365	328,920	314,160	432,948	118,788	
Mercer.....	450,071	425,518	384,345	503,474	119,129	
Montgomery.....	171,099	251,249	294,667	301,424	6,757	
Morgan.....	(a)		1,800	4,506	2,706	
Peoria.....	457,061	504,309	640,193	792,239	152,046	
Perry.....	626,507	689,921	845,329	809,425		35,904
Randolph.....	202,838	150,647	274,072	437,034	162,962	
Rock Island.....	34,065	35,651	47,490	44,005		3,485
St. Clair.....	1,671,323	1,718,194	1,600,752	2,079,353	478,601	

a Jersey County includes product of Morgan County.

MINERAL RESOURCES.

Coal product of Illinois in 1896, 1897, 1898, and 1899, by counties—Continued.

County.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Saline	46,495	51,689	100,005	95,736	.....	4,269
Sangamon	1,587,812	1,838,453	1,763,863	2,289,708	525,845	.....
Schuyler	7,915	7,841	11,149	15,874	4,725	.....
Scott	18,410	25,125	21,337	22,227	890	.....
Shelby	35,297	69,329	68,388	105,409	37,021	.....
Stark	18,085	19,472	21,936	25,430	3,494	.....
Tazewell	113,541	86,669	84,507	98,092	13,585	.....
Vermilion	1,822,344	2,000,623	1,520,699	2,191,067	670,368	.....
Warren	12,696	10,099	12,245	16,992	4,747	.....
Washington	33,360	25,715	43,808	32,360	.....	11,448
Will	86,950	25,682	40,904	42,275	1,371	.....
Williamson	444,406	669,480	915,108	1,072,367	157,259	.....
Woodford	162,790	148,829	145,840	179,024	33,184	.....
Total	19,786,626	20,072,758	18,599,299	24,439,019	5,839,720	.....

a Net increase.

Distribution of the coal product of Illinois from 1889 to 1899.

Year.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke at the mines.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889..	a 854	9,884,883	1,816,702	395,787	12,900	12,104,272	\$11,755,203	\$.97	.....	.....
1890..	936	12,539,784	2,130,539	606,497	15,600	15,292,420	14,171,230	.98	204	28,574
1891..	918	12,787,993	2,246,705	610,000	16,000	15,660,698	14,237,074	.91	216	32,951
1892..	839	14,557,655	2,624,821	675,000	4,900	17,862,276	16,243,645	.91	220	34,585
1893..	788	16,260,463	2,931,846	753,955	3,300	19,949,564	17,827,596	.89	229	35,890
1894..	836	13,948,910	2,590,414	570,452	3,800	17,113,576	15,282,111	.89	183	38,477
1895..	b 319	14,456,524	2,684,607	591,133	3,600	17,735,864	14,239,157	.80	182	38,630
1896..	330	16,128,103	2,995,022	659,601	3,900	19,786,626	15,809,736	.80	186	33,054
1897..	310	16,358,221	3,041,712	669,012	3,813	20,072,758	14,472,529	.72	185	33,788
1898..	329	15,596,885	2,149,808	852,603	.....	18,599,299	14,567,598	.78	175	35,026
1899..	550	21,871,930	1,936,515	630,574	.....	24,439,019	20,744,553	.85	228	36,756

a From 1889 to 1894, including shipping and local mines.

b Since 1894, shipping or commercial mines only.

Total number of mines, men, and product, lump and other grades, since 1882.^a

Fiscal year ending June 30—	Whole number of mines.	Whole number of men employed.	Total product in tons (2,000 pounds).	Total tons of lump coal.	Total tons of other grades.
1882.....	704	20,290	11,017,069	9,115,653	1,901,506
1883.....	639	23,939	12,123,456	10,030,991	2,092,465
1884.....	741	25,575	12,208,075	10,101,005	2,107,070
1885.....	778	25,946	11,834,459	9,791,874	2,402,585
1886.....	787	25,846	11,175,241	9,246,435	1,928,806
1887.....	801	26,804	12,423,066	10,278,890	2,144,176
1888.....	822	29,410	14,328,181	11,855,188	2,472,993
1889.....	854	30,076	14,017,298	11,597,963	2,419,335
1890.....	936	28,574	15,292,420	12,638,364	2,654,056
1891.....	918	32,951	15,660,698	12,960,224	2,700,474
1892.....	839	34,585	17,862,276	14,730,963	3,131,313
1893.....	788	35,390	19,949,564	16,112,899	3,836,655
1894.....	836	38,477	17,113,576	13,865,284	3,248,292
1895.....	874	38,630	17,735,864	14,045,962	3,689,902
1896.....	901	33,054	19,786,626	14,210,024	5,576,602
1897.....	853	33,788	20,072,758	14,672,241	5,400,517
1898.....	881	35,026	18,599,299	14,208,795	4,390,504
1899.....	889	36,991	23,434,445	17,427,598	6,006,847

^a Fiscal years taken from the State report.

INDIANA.

Total product in 1899, 6,006,523 short tons; spot value, \$5,285,018.

In the report for 1898 attention was called to the fact that Indiana in that year had reaped the benefit of the decreased production in Illinois brought about by the protracted strikes in that State, and that this had been the cause of the increase of 770,000 tons in the product for 1898 as compared with 1897. It was suggested that with the return to normal conditions in Illinois, Indiana would probably lose the markets obtained in 1898. Such, however, does not seem to have been the case, if the statistics for 1899 may be taken as an indication, for in spite of an increase of approximately 6,000,000 tons in the output from Illinois mines, the product of Indiana increased 1,085,780 tons, and makes the State firmly fixed as the sixth in coal-producing importance in the country. In the value of the product the increase in 1899 is even more pronounced, \$1,290,100 being added to the value of the product in 1898, and the average price advancing from 81 cents to 88 cents per ton.

The number of machines employed in Indiana mines increased from 233 in 1898 to 247 in 1899, while the machine-mined product increased from 1,414,342 tons to 1,713,125 tons.

The statistics of production in the past two years have been as follows:

Coal product of Indiana in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Clay	26	890,609	13,523	24,475	.....	928,607	\$984,898	\$1.06	182	2,416
Davies	9	148,528	49,589	4,576	.....	202,693	189,668	.94	217	447
Fountain	3	135,800	2,900	500	.....	139,200	138,720	.96	274	130
Gibson	2	38,000	28,501	6,506	.....	63,006	50,825	.81	217	85
Greene	8	519,236	3,664	3,900	.....	526,800	427,875	.81	167	994
Knox	3	32,833	18,427	5,272	.....	56,532	46,824	.83	177	138
Owen and Parke	18	534,481	6,469	18,045	.....	558,945	473,548	.85	198	1,117
Perry	2	19,537	7,225	400	.....	27,162	27,277	1.00	181	90
Pike	7	238,803	1,390	4,220	4,065	248,478	139,309	.56	193	390
Spencer	9	.....	6,623	10	.....	6,633	7,967	1.20	140	33
Sullivan	15	586,581	37,828	13,490	.....	637,849	411,472	.65	181	826
Vanderburg	6	46,538	138,674	11,860	.....	197,072	177,603	.90	243	352
Vermillion	3	250,238	.....	11,500	.....	261,738	166,493	.64	194	375
Vigo	17	843,510	18,242	22,357	.....	884,109	617,739	.70	244	1,371
Warrick	13	118,484	23,735	3,700	.....	145,919	103,700	.71	211	207
Small mines .....	.....	.....	36,000	.....	.....	36,000	36,000	.....	.....	.....
Total	141	4,398,078	387,790	130,810	4,065	4,920,743	3,994,918	.81	199	8,971

Coal product of Indiana in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Clay	31	1,204,788	11,368	37,792	.....	1,253,948	\$1,382,685	\$1.10	212	2,485
Davies	7	194,214	68,050	3,765	.....	266,029	221,734	.83	240	509
Martin										
Fountain	2	55,250	500	.....	.....	55,750	49,385	.89	311	120
Gibson	2	49,656	19,952	5,812	.....	75,420	66,010	.87	182	83
Greene	9	660,929	2,045	18,825	.....	681,799	613,507	.90	189	1,321
Knox	3	29,113	18,089	2,482	.....	49,684	56,272	1.13	196	90
Parke	11	607,872	23,594	6,715	.....	638,181	657,159	1.03	230	1,078
Perry	2	21,400	7,000	300	.....	28,700	29,118	1.01	175	65
Pike	7	180,077	3,187	4,606	3,719	191,589	157,898	.82	152	495
Spencer	8	1,000	12,946	.....	.....	13,946	17,027	1.22	151	43
Sullivan	13	702,106	23,440	27,188	.....	752,734	500,967	.67	238	743
Vanderburg	5	23,982	118,942	9,506	.....	152,430	149,531	.98	219	279
Vermillion	4	605,076	.....	4,800	.....	609,876	450,486	.74	206	845
Vigo	15	984,226	11,420	34,053	.....	1,029,699	764,644	.74	267	1,332
Warrick	17	145,920	20,041	4,777	.....	170,738	132,595	.78	193	224
Small mines .....	.....	.....	36,000	.....	.....	36,000	36,000	.....	.....	.....
Total	136	5,465,609	376,574	160,621	3,719	6,006,523	5,285,018	.88	218	9,712

Distribution of the coal product of Indiana from 1889 to 1899.

Year.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889.....		2,527,112	237,935	67,210	12,800	2,845,057	\$2,887,852	\$1.02	.....	6,448
1890.....		3,036,737	225,167	34,703	9,130	3,305,737	3,259,233	.91	220	5,489
1891.....		2,689,780	211,854	63,152	8,688	2,973,474	3,070,918	1.03	190	5,879
1892.....		3,068,911	206,220	42,621	5,422	3,345,174	3,620,562	1.06	225	6,436
1893.....		3,461,830	252,879	69,797	7,345	3,791,851	4,055,372	1.07	201	7,644
1894.....	107	3,065,664	248,398	67,545	22,314	3,423,921	3,295,034	.96	149	8,603
1895.....	117	3,488,876	392,423	104,695	9,898	3,995,892	3,642,623	.91	189	8,530
1896.....	131	3,471,470	311,911	113,442	8,956	3,905,779	3,261,737	.84	163	8,806
1897.....	115	3,639,758	393,012	111,376	7,023	4,151,169	3,472,348	.84	176	8,886
1898.....	141	4,398,078	387,790	130,810	4,065	4,920,743	3,994,918	.81	199	8,971
1899.....	136	5,465,609	376,574	160,621	3,719	6,006,523	5,285,018	.88	218	9,712

The product by counties during the past five years is presented in the following table, with the increase or decrease in each county in 1899:

Coal product of Indiana since 1895, by counties.

County.	1895.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Clay.....	1,223,186	1,232,435	925,727	928,607	1,253,948	325,341	.....
Daviess.....	81,380	192,775	211,797	202,693	a 266,029	63,336	.....
Fountain.....		106,650	137,250	139,200	55,750	.....	83,450
Gibson.....	1,940	24,775	41,409	63,006	75,420	12,414	.....
Greene.....	409,080	290,046	448,873	526,800	681,799	154,999	.....
Knox.....	26,443	30,500	36,752	56,532	49,684	.....	6,848
Owen.....				7,808		.....	7,808
Parke.....	479,609	339,677	434,007	551,137	638,181	87,044	.....
Perry.....	18,960	26,227	23,712	27,162	28,700	1,538	.....
Pike.....	232,950	201,417	248,043	248,478	191,589	.....	56,889
Spencer.....	10,879	16,703	4,339	6,633	13,946	7,313	.....
Sullivan.....	453,167	515,285	480,045	637,849	752,734	114,885	.....
Vanderburg.....	192,710	170,755	182,800	197,072	152,430	.....	44,642
Vermillion.....	306,000	347,166	321,560	261,738	609,876	348,138	.....
Vigo.....	402,335	237,647	442,531	884,109	1,029,699	145,590	.....
Warrick.....	121,253	138,721	176,324	145,919	170,738	24,819	.....
Small mines.....	36,000	36,000	36,000	36,000	36,000	.....	.....
Total.....	3,995,892	3,905,779	4,151,169	4,920,743	6,006,523	b 1,085,780	.....

a Includes Martin County.

b Net increase.

MINERAL RESOURCES.

Product of coal in Indiana from 1873 to 1899.

Year.	Short tons.	Year.	Short tons.
1873.....	1,000,000	1887.....	3,217,711
1874.....	812,000	1888.....	3,140,979
1875.....	800,000	1889.....	2,845,057
1876.....	950,000	1890.....	3,305,737
1877.....	1,000,000	1891.....	2,973,474
1878.....	1,000,000	1892.....	3,345,174
1879.....	1,196,490	1893.....	3,791,851
1880.....	1,500,000	1894.....	3,423,921
1881.....	1,771,536	1895.....	3,995,892
1882.....	1,976,470	1896.....	3,905,779
1883.....	2,560,000	1897.....	4,151,169
1884.....	2,260,000	1898.....	4,920,743
1885.....	2,375,000	1899.....	6,006,523
1886.....	3,000,000		

INDIAN TERRITORY.

Total product in 1899, 1,537,427 short tons; spot value, \$2,199,785.

In spite of strikes, which occurred in 19 out of the 29 mines in the Territory and gave enforced idleness to 1,825 men for an average of 154 days, the coal production in 1899 increased 155,961 short tons, or about 10 per cent, over that of 1898. The value of the product increased in somewhat greater ratio, or 20 per cent, from \$1,827,638 in 1898 to \$2,199,785 in 1899. The average price per ton advanced 11 cents, from \$1.32 to \$1.43.

The strikes in the mines of the Territory were precipitated by the demand of the miners' union that it should be recognized as such, and the refusal of the operators to comply with the demand. So far as has been ascertained, the miners had no complaint to make in regard to wages, it being simply a question of whether the operators should deal with each employee individually or should recognize the union and deal with it. The struggle lasted during the greater part of the year, and while few of the mines were closed down entirely for any considerable length of time, the total time lost by the strike was equal to about one-third of the actual working time made by all the miners and other laborers in the Territory. The total average number of men on the pay rolls for the year was 4,084, and the average working time made by them was 212 days, or a total of 864,196 working days. The total working time lost by the 1,825 men on strike was 281,256 days, or an average of 154 days each.

The statistics of machine-mined coal in the Territory show that there was a decrease of one machine in the number in use (75 to 74) and a slight gain (less than 1 per cent) in the machine-mined tonnage.

The details of production during the past nine years are presented in the following table:

Distribution of the coal product of the Indian Territory since 1891.

Year.	Num-ber of mines.	Loaded at mines for shipment.	Sold to local trade and used by em-ployees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver-age price per ton.	Aver-age number of days active.	Average number of em-employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1891.....		1,026,932	9,405	22,163	32,532	1,091,032	\$1,897,037	\$1.74	222	2,891
1892.....		1,156,603	10,840	18,089	7,199	1,192,721	2,043,479	1.71	211	3,257
1893.....		1,197,468	9,234	21,663	23,745	1,252,110	2,235,209	1.79	171	3,446
1894.....		923,581	4,632	30,878	10,515	969,606	1,541,293	1.59	157	3,101
1895.....	16	1,173,399	3,070	21,935	12,781	1,211,185	1,737,254	1.43	164	3,212
1896.....	21	1,295,742	12,648	45,560	12,696	1,366,646	1,918,115	1.40	170	3,549
1897.....	19	1,250,066	9,068	47,501	29,745	1,336,380	1,737,358	1.34	176	3,168
1898.....	22	1,310,178	16,682	34,055	20,601	1,381,466	1,827,638	1.32	198	3,216
1899.....	29	1,444,063	12,280	54,222	26,862	1,537,427	2,199,785	1.43	212	4,084

Since 1885 the annual production has been as follows:

Product of coal in the Indian Territory from 1885 to 1899, inclusive.

Year.	Quantity.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>				
1885.....	500,000				
1886.....	534,580	\$855,328	\$1.60		
1887.....	685,911	1,286,692	1.88		
1888.....	761,986	1,432,072	1.89		
1889.....	752,832	1,323,807	1.76		1,862
1890.....	869,229	1,579,188	1.82	238	2,571
1891.....	1,091,032	1,897,037	1.71	222	2,891
1892.....	1,192,721	2,043,479	1.71	211	3,257
1893.....	1,252,110	2,235,209	1.79	171	3,446
1894.....	969,606	1,541,293	1.59	157	3,101
1895.....	1,211,185	1,737,254	1.43	164	3,212
1896.....	1,366,646	1,918,115	1.40	170	3,549
1897.....	1,336,380	1,787,358	1.34	176	3,168
1898.....	1,381,466	1,827,638	1.32	198	3,216
1899.....	1,537,427	2,199,785	1.43	212	4,084

IOWA.

Total product in 1899, 5,177,479 short tons; spot value, \$6,397,338.

Iowa, for the first time in the history of the State, contributed over 5,000,000 short tons to the total coal product of the country. Previous to 1899 the record of maximum yearly production was made in 1888, when a total output of 4,952,440 short tons was obtained. The value of the product in 1888 slightly exceeded that of 1899. Compared with 1898 the production in 1899 shows an increase of 558,637 short tons, or about 12 per cent in quantity, and of \$1,133,622 or 21.6 per cent in value. The average price per ton, \$1.24, was the highest recorded in five years. Strikes of comparatively short duration occurred in 31 of the 230 active and reporting mines. The average working time lost by each man on strike was only 28 days, and although a total of 2,623 men were made idle the total working time lost was but 72,710 days—less than 3 per cent of the actual working time made by the 10,971 men employed in and about the mines. Notwithstanding the strikes the average number of days made in 1899 showed an increase of 10 over 1898.

The use of machines, according to the reports for 1899, shows a decided falling off. This may be due to incomplete returns, but the reports as received show that the number of machines in use decreased from 56 in 1898 to 41 in 1899, and the machine-mined coal decreased from 218,852 to 124,721 tons. The number of firms reporting machines dropped from 9 to 4.

Coal product of Iowa in 1898, by counties.

County.	Num- ber of mines.	Loaded at mines for shipment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Appanoose	49	569,020	34,857	4,288	608,165	\$726,932	\$1.20	172	1,955
Boone	17	298,613	32,076	854	331,543	473,342	1.43	245	1,096
Dallas	2	2,964	4,013	930	7,907	12,653	1.60	227	32
Greene	5	665	11,480	775	12,920	21,318	1.65	194	60
Jasper	6	140,000	3,925	10	143,935	205,686	1.43	210	268
Keokuk	9	220,909	25,636	4,600	251,145	265,886	1.06	240	521
Mahaska	21	1,238,810	37,895	16,082	1,292,787	1,304,727	1.01	236	2,400
Marion	15	114,964	11,822	517	127,298	113,329	.89	217	245
Monroe	7	558,479	11,947	14,152	584,578	594,980	1.02	232	1,086
Page and Story..	3	4,990	6,295	400	11,685	20,124	1.72	172	47
Polk	16	428,824	194,217	12,565	635,606	787,940	1.24	234	1,353
Taylor	2	5,660	880	15	6,555	12,485	1.90	182	26
Van Buren	2	4,220	2,280	100	6,600	9,600	1.45	257	14
Wapello	8	229,544	13,190	6,890	249,624	254,661	1.02	212	472
Warren	4	300	6,814	6	7,120	10,570	1.48	88	46
Wayne	3	38,643	12,352	555	51,550	68,633	1.33	201	205
Webster	13	119,967	14,928	2,653	137,548	180,885	1.32	222	379
Adams	5	4,800	7,456	25	12,281	21,965	1.79	197	57
Lucas									
Small mines			140,000		140,000	175,000			
Total	187	3,981,362	572,063	65,417	4,618,842	5,260,716	1.14	219	10,262

Coal product of Iowa in 1899, by counties.

County.	Num- ber of mines.	Loaded at mines for shipment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Adams	6		12,556	104	12,660	\$22,319	\$1.76	139	45
Appanoose	46	605,956	25,239	5,226	636,421	876,623	1.38	198	2,122
Boone	18	261,488	26,097	2,940	290,525	468,787	1.61	225	930
Dallas	2	3,210	6,811	783	10,804	16,357	1.52	254	87
Davis and Lee	2		412		412	724	1.76	82	5
Greene	6	3,605	12,993	970	17,568	28,136	1.60	200	65
Jasper	9	173,504	15,738	2,686	191,928	221,655	1.15	264	286
Keokuk	13	273,267	33,432	8,201	314,900	362,946	1.15	235	530
Lucas	3	28,566	2,742	1,111	32,419	44,752	1.38	178	126
Mahaska	22	1,211,320	44,464	17,689	1,273,473	1,427,329	1.12	262	2,258
Marion	18	206,474	20,924	4,270	231,668	253,606	1.10	225	526
Monroe	10	668,906	8,558	11,541	689,004	725,962	1.05	221	1,213
Page	3	1,320	2,680		4,000	9,000	2.25	152	26
Polk	23	560,194	177,604	11,910	749,708	977,086	1.30	232	1,427
Scott	2		7,063	295	7,348	12,895	1.75	262	34
Story	2	2,200	4,388	200	6,788	15,364	2.26	201	29
Taylor	3	9,500	1,450	15	10,965	20,570	1.88	159	56
Van Buren	3	6,805	2,480	100	9,385	14,077	1.50	253	19
Wapello	14	277,733	42,362	4,984	325,029	371,514	1.14	269	586
Warren	5	22,260	12,525	30	34,815	64,138	1.84	238	71
Wayne	4	53,319	8,999	500	62,818	88,548	1.41	205	229
Webster	16	110,117	12,894	1,830	124,841	200,010	1.60	213	351
Small mines			140,000		140,000	175,000			
Total	230	4,479,743	622,401	75,335	5,177,479	6,397,338	1.24	229	10,971

Distribution of the coal product of Iowa from 1889 to 1899.

Year.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889		3,530,373	464,735	100,213	37	4,095,358	\$5,426,509	\$1.33	.....	9,247
1890		3,560,738	397,503	63,498		4,021,739	4,995,739	1.24	213	8,130
1891		3,263,347	373,025	88,966	157	3,825,495	4,867,999	1.27	224	8,124
1892		3,459,025	401,855	57,611		3,918,491	5,175,060	1.32	236	8,170
1893		3,442,584	449,639	80,006		3,972,229	5,110,460	1.30	204	8,863
1894 ... 174		3,390,751	511,683	64,819		3,967,253	4,997,939	1.26	170	9,995
1895 ... 177		3,630,867	460,820	64,387		4,156,074	4,982,102	1.20	189	10,066
1896 ... 182		3,367,819	494,443	91,766		3,954,028	4,628,022	1.17	178	9,672
1897 ... 162		4,023,944	516,427	71,494		4,611,865	5,219,503	1.13	201	10,703
1898 ... 187		3,981,362	572,063	65,417		4,618,842	5,260,716	1.14	219	10,262
1899 ... 230		4,479,743	622,401	75,335		5,177,479	6,397,338	1.24	229	10,971

MINERAL RESOURCES.

Coal product of Iowa since 1895, by counties.

County.	1895.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Appanoose	588,438	544,678	670,143	608,165	636,421	28,256	.....
Boone	268,422	316,756	292,218	331,543	290,525	.....	41,018
Dallas	6,061	9,624	6,853	7,907	10,804	2,897	.....
Greene	7,197		9,245	12,920	17,568	4,648	.....
Jasper	155,707	164,110	175,316	143,935	191,928	47,993	.....
Keokuk	266,394	214,474	289,478	251,145	314,900	63,755	.....
Mahaska	1,016,623	1,047,241	1,420,510	1,292,787	1,273,473	.....	19,314
Marion	193,768	93,023	129,502	127,293	231,668	104,375	.....
Monroe	559,982	433,520	497,831	584,578	689,004	104,426	.....
Polk	485,360	546,051	489,136	635,606	749,708	114,102	.....
Taylor	14,062	8,400	10,726	6,555	10,965	4,410	.....
Van Buren	9,896	8,396	5,760	6,600	9,385	2,785	.....
Wapello	261,510	227,077	229,470	249,624	325,029	75,405	.....
Warren	6,116	12,824	6,610	7,120	34,815	27,695	.....
Wayne	46,315	42,732	56,996	51,550	62,818	11,268	.....
Webster	123,882	134,704	168,899	137,548	124,841	.....	12,707
Other counties and small mines	146,341	150,418	153,172	163,966	203,627	39,661	.....
Total	4,156,074	3,954,028	4,611,865	4,618,842	5,177,479	558,637	.....

^a Net increase.

Iowa continues to hold first place among the coal-producing States west of the Mississippi River, and seventh place among all the coal-producing States. These relative positions have been held since 1893. The development of the coal-mining industry can be seen from the following table, which shows that in thirty-nine years the annual output has increased more than 100 times.

Product of coal in Iowa from 1860 to 1899, inclusive.

Year.	Quantity.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>				
1860.....	48,263	\$92,180	\$1.91		
1865.....	69,574				
1866.....	99,320				
1868.....	241,453				
1870.....	283,467				
1875.....	1,231,547	2,500,140	2.03		
1880.....	1,461,166	2,507,453	1.72		
1882.....	3,920,000				
1883.....	4,457,540				
1884.....	4,370,566				
1885.....	4,012,575				
1886.....	4,315,779	5,391,151	1.25		
1887.....	4,473,828	5,991,735	1.34		
1888.....	4,952,440	6,438,172	1.30		
1889.....	4,095,358	5,426,509	1.33		9,247
1890.....	4,021,739	4,995,739	1.24	213	8,130
1891.....	3,825,495	4,807,999	1.27	224	8,124
1892.....	3,918,491	5,175,060	1.32	236	8,170
1893.....	3,972,229	5,110,460	1.30	204	8,863
1894.....	3,967,253	4,997,939	1.26	170	9,995
1895.....	4,156,074	4,982,102	1.20	189	10,066
1896.....	3,954,028	4,628,022	1.17	178	9,672
1897.....	4,611,865	5,219,503	1.13	201	10,703
1898.....	4,618,842	5,260,716	1.14	219	10,256
1899.....	5,177,479	6,397,338	1.24	229	10,971

KANSAS.

Total product in 1899, 3,852,267 short tons; spot value, \$4,478,112.

The coal product of Kansas in 1899 was the largest in the history of the State, both in amount and value. The State ranks third among the coal-producing States west of the Mississippi River and second among those comprising the Western coal field. Production in Kansas has increased each year since 1896. The average price in 1899, while higher than in 1898, was lower than in 1897, or in any year previous to 1896.

The use of mining machines in Kansas has not reached an important stage. The total number in use in 1899 was 3, a gain of one over 1898. The product won by machines amounted to 40,271 tons, as

compared with 11,722 tons in 1898 and 4,500 tons in 1897, the first year machines were used.

The working time lost by reason of strikes in 1899 amounted to about 5 per cent of the total time made. One strike lasted but three days, one lasted three hundred days, ten lasted between thirty and sixty days. The average time lost by the 1,986 men involved was forty-five days.

The details of production in 1898 and 1899, by counties, are shown in the following tables:

Coal product of Kansas in 1898, by counties.

County.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Cherokee.....	26	1,070,189	22,142	18,196	1,110,527	\$1,116,493	\$1.01	183	2,263
Crawford.....	27	1,621,070	16,777	16,646	1,654,493	1,715,431	1.04	225	2,887
Franklin.....	2	1,518	4,915		6,433	11,459	1.78	158	40
Leavenworth.....	5	207,399	83,532	14,645	305,576	401,892	1.32	207	759
Linn.....	2	18,293	2,249		20,542	21,769	1.06	251	74
Osage.....	37	161,132	20,579	445	182,156	297,587	1.63	128	1,103
Atchison, Cloud, Coffey, and Elk.....	5		5,180		5,180	14,005	2.70	121	42
Ellsworth, Labette, and Lincoln.....	4		845		845	1,998	2.36	50	22
Russell and Shaw- nee.....	2		803		803	2,380	2.96	111	7
Small mines.....			120,000		120,000	120,000			
Total.....	110	3,079,601	277,022	49,932	3,406,555	3,703,014	1.09	194	7,197

Coal product of Kansas in 1899, by counties.

County.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Cherokee.....	27	1,126,767	18,613	16,762	1,162,142	\$1,186,943	\$1.02	215	2,321
Cloud.....	6	583	4,000		4,583	11,267	2.46	153	29
Crawford.....	30	1,903,405	22,166	25,933	1,951,504	2,085,136	1.07	253	3,335
Franklin.....	2	2,225	11,800	25	14,050	28,100	2.00	265	40
Leavenworth.....	4	247,270	58,094	7,481	312,845	540,073	1.73	245	988
Linn.....	2	11,595	5,665		17,260	19,941	1.16	203	62
Osage.....	41	229,212	32,468	651	262,331	464,839	1.77	159	1,168
Atchison, Chautau- qua, Coffey, Elk, and Lyon.....	5	3,000	3,166		6,166	17,658	2.86	135	37
Ellsworth, Lincoln, and Russell.....	6	440	946		1,386	4,155	3.00	95	20
Small mines.....			120,000		120,000	120,000			
Total.....	123	3,524,497	276,918	50,852	3,852,267	4,478,112	1.16	226	8,000

The distribution of the product for consumption, the total value, and the statistics of labor employed in Kansas coal mines for the past eleven years have been as follows:

Distribution of the coal product of Kansas from 1889 to 1899.

Year.	Num- ber of mines.	Loaded at mines for shipment.	Sold to lo- cal trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
1889		1,891,090	300,207	29,246	500	2,221,043	\$3,296,888	\$1.48		5,956
1890		2,028,100	224,839	6,983		2,259,922	2,947,517	1.30	210	4,523
1891		2,428,787	255,839	31,946	133	2,716,705	3,557,305	1.31	222	6,201
1892		2,756,812	206,038	44,325	101	3,007,276	3,955,595	1.32	208	6,559
1893		2,364,810	227,321	60,412	3	2,652,546	3,375,740	1.27	147	7,310
1894 113		3,066,398	275,565	45,523	765	3,348,251	4,178,998	1.23	164	7,339
1895 106		2,587,602	279,739	59,142	387	2,926,870	3,481,981	1.20	159	7,482
1896 96		2,562,779	256,906	63,901	1,215	2,884,801	3,295,032	1.15	168	7,127
1897 71		2,745,101	253,933	54,730	248	3,054,012	3,602,326	1.18	194	6,639
1898 110		3,079,601	277,022	49,922		3,406,555	3,708,014	1.09	194	7,197
1899 123		3,524,497	276,918	50,852		3,852,267	4,478,112	1.16	226	8,000

The following table shows the production during the past four years, distributed by counties. It is observed that all of the coal-producing counties with one exception participated in the general business revival and increased production in 1899:

Coal product of Kansas in 1896, 1897, 1898, and 1899, by counties.

County.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	Short tons.	Short tons.	Short tons.	Short tons.	Short tons.	Short tons.
Atchison	4,592	7,250	3,000	3,000		
Cherokee	985,132	1,004,921	1,110,527	1,162,142	51,615	
Crawford	1,271,434	1,352,923	1,654,493	1,951,504	297,011	
Franklin	12,861	5,140	6,433	14,050	7,617	
Leavenworth ..	284,700	366,362	305,576	312,845	7,269	
Linn	14,534	27,432	20,542	17,260		3,282
Osage	190,948	169,395	182,156	262,331	80,175	
Other counties and small mines	120,600	120,589	123,828	129,135	5,307	
Total	2,884,801	3,054,012	3,406,555	3,852,267	a 445,712	

a Net increase.

The following table shows, in condensed form, the statistics of coal production in Kansas since 1880. The increase in production has been remarkably regular, there being but three years in which the output was less than in the preceding year, and all of these years were during the period of trade depression—1893, 1895, and 1896:

Coal product of Kansas since 1880.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of men employed.
1880.....	550,000				
1881.....	750,000				
1882.....	750,000				
1883.....	900,000				
1884.....	1,100,000				
1885.....	1,212,057	\$1,485,002	\$1.23		
1886.....	1,400,000	1,680,000	1.20		
1887.....	1,596,879	2,235,631	1.40		
1888.....	1,850,000	2,775,000	1.50		
1889.....	2,221,043	3,296,888	1.48		5,956
1890.....	2,259,922	2,947,517	1.30	210	4,523
1891.....	2,716,705	3,557,305	1.31	222	6,201
1892.....	3,007,276	3,955,595	1.32	208	6,559
1893.....	2,652,546	3,375,740	1.27	147	7,310
1894.....	3,388,251	4,178,998	1.23	164	7,339
1895.....	2,926,870	3,481,981	1.20	159	7,482
1896.....	2,884,801	3,295,032	1.15	168	7,127
1897.....	3,054,012	3,602,326	1.18	194	6,639
1898.....	3,406,555	3,703,014	1.09	194	7,197
1899.....	3,852,267	4,478,112	1.16	226	8,000

KENTUCKY.

Total product in 1899, 4,607,255 short tons; spot value, \$3,618,222.

Prior to 1899 the coal product in Kentucky had never reached a total of 4,000,000 tons, and in only one year (1898) had the value of the output reached as high as \$3,000,000, while in 1899 an increase of more than half a million was added to the above figures both in the tonnage and in the value. The increases in product and value were in direct proportion, there being no change in the average value per ton as reported to the Survey. There were four other States in which there was no change in price and five in which the price declined.

Kentucky is the only State of the Union whose product is obtained from any two of the great fields. The eastern section of the State is crossed by the Appalachian system, while the central, or Illinois field, has its southern extremity in the coal-producing counties of western Kentucky. Exclusive of the estimated production of the small local mines, the product of eastern Kentucky was 1,810,450 short tons in 1899 against 1,520,710 tons in 1898; the production in western Kentucky was 2,646,805 short tons in 1899 and 2,217,198 tons in 1898. The increase in production of the two fields in 1899 was about in the proportion of their producing importance.

A few strikes occurred in the Kentucky coal mines in 1899, but they were not of sufficient importance to materially affect the production of the State for the year.

The use of mining machines increased somewhat; the number employed in 1899 being 189 as compared with 158 in 1898. The tonnage increased from 1,366,676 in 1898 to 1,625,809 in 1899.

The details of production in 1898 and 1899 have been as follows:

Coal product of Kentucky in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bell.....	8	79,539	4,343	1,562	100	85,544	\$109,782	\$1.28	151	271
Boyd.....	2	204,836	1,141	2,785		208,762	154,584	.74	228	280
Butler.....	2	29,586	4,480		48	34,114	46,094	1.35	146	124
Carter.....	7	62,576	269	900		63,745	58,981	.92	158	220
Hancock.....	2	9,390	60			9,450	15,064	1.90	243	52
Henderson..	5	71,020	14,295	1,080		86,395	69,847	.81	201	200
Hopkins.....	12	886,769	23,478	23,216	41,496	974,959	623,758	.64	214	1,533
Johnson.....	2	11,937	279			12,216	31,066	2.54	241	83
Knox.....	4	280,348	627	600		281,575	215,217	.76	253	324
Laurel.....	13	286,690	699	1,089		288,478	230,707	.80	197	778
Lawrence.....	2	45,921	9,389	4,290		59,600	42,938	.72	224	118
Lee.....	3	24,916	680	200		25,796	24,950	.97	254	66
McLean.....	3	21,715	10			21,725	16,364	.75	112	49
Muhlenberg	9	309,346	3,120	4,726		317,392	229,540	.72	148	689
Ohio.....	9	429,575	4,250	6,186		440,011	278,090	.63	179	812
Pulaski.....	6	84,815	640	1,315		86,770	79,281	.91	175	301
Union.....	7	183,847	5,398	4,420		193,665	154,593	.80	137	456
Webster.....	3	50,229	5,001	620		55,850	36,418	.65	179	117
Whitley.....	12	377,378	7,929	1,977		387,284	359,398	.91	165	945
Christian.....	3	66,496	17,141			83,637	101,221	1.21	225	136
Daviess.....										
Breathitt.....										
Greenup.....	2	20,500	200	240		20,940	19,158	.91	137	60
Small mines.			150,000			150,000	187,500			
Total..	116	3,537,429	253,629	55,206	41,644	3,887,908	3,084,561	.79	187	7,614

MINERAL RESOURCES.

Coal product of Kentucky in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bell	8	106,051	6,154	2,276	38,453	152,934	\$142,953	\$0.93	275	304
Boyd	2	167,045	1,279	3,114		171,438	121,969	.71	243	240
Butler	2	32,466	2,708			35,174	31,057	.88	167	136
Carter	8	181,617	1,967	1,200		184,784	158,109	.86	222	274
Henderson ..	4	122,317	13,311	1,000		136,628	97,514	.71	216	210
Hopkins	11	1,072,454	30,473	22,025	79,731	1,204,683	794,878	.66	250	1,605
Johnson	2	12,265	199			12,464	25,098	2.01	251	90
Knox	3	227,682	3,400	4,600		235,682	188,043	.80	223	364
Laurel	11	340,935	8,034	750		349,719	275,192	.76	217	698
Muhlenberg ..	8	405,932	4,850	3,550		414,332	299,499	.72	203	750
Ohio	8	491,022	6,491	8,400		505,913	339,841	.67	212	830
Pulaski	3	101,214	755	1,500		103,469	103,147	1.00	237	219
Union	5	166,278	12,692	6,435		185,405	172,509	.93	205	214
Webster	2	104,256	12,169	5,966		122,391	82,991	.68	210	128
Whitley	12	514,312	8,685	2,320		525,317	497,764	.95	211	1,119
Daviess	4	36,935	5,344			42,279	40,200	.95	179	98
Hancock										
McLean										
Breathitt										
Greenup	4	56,418	14,225	4,000		74,643	59,958	.80	198	182
Lawrence										
Lee										
Small mines			150,000			150,000	187,500			
Total ..	97	4,139,199	282,736	67,136	118,184	4,607,255	3,618,222	.79	224	7,461

Distribution of the coal product of Kentucky from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889		2,111,010	246,306	23,981	18,458	2,399,755	\$2,374,339	\$0.98		
1890		2,357,989	291,666	29,568	22,273	2,701,496	2,472,119	.92	219	5,259
1891		2,559,263	285,281	21,363	50,162	2,916,069	2,715,600	.93	225	6,355
1892		2,620,556	327,985	33,856	42,916	3,025,313	2,771,238	.92	217	6,724
1893		2,613,645	281,115	30,969	81,450	3,007,179	2,613,569	.86	202	6,581
1894		2,734,847	281,235	47,344	47,766	3,111,192	2,749,932	.88	145	8,083
1895	120	3,012,610	254,028	50,294	40,838	3,357,770	2,890,247	.86	153	7,799
1896	112	2,980,355	251,897	55,447	45,779	3,333,478	2,684,306	.78	165	7,549
1897	109	3,088,132	404,099	55,033	54,833	3,602,097	2,828,329	.79	178	7,983
1898	116	3,537,429	253,629	55,206	41,644	3,887,908	3,084,551	.79	187	7,614
1899	97	4,139,199	282,736	67,136	118,184	4,607,255	3,618,222	.79	224	7,461

The total production distributed by counties for the last four years, with the increases and decreases in 1899 as compared with 1898, is shown in the following table:

Coal product of Kentucky since 1896, by counties.

County.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Bell	89, 534	103, 261	85, 544	152, 934	67, 390	
Boyd	121, 022	192, 538	208, 762	171, 438		37, 324
Butler	28, 444	21, 847	34, 114	35, 174	1, 060	
Carter	136, 066	124, 346	63, 745	184, 784	121, 039	
Breathitt	2, 406	10, 053	18, 440	15, 700		2, 740
Christian	13, 124	13, 000	66, 496			66, 496
Daviess	3, 232	3, 200	17, 141	2, 464		14, 677
Greenup	854	852	2, 500	4, 225	1, 725	
Hancock	17, 842	17, 702	9, 450	10, 020	570	
Henderson	119, 540	107, 187	86, 395	136, 628	50, 233	
Hopkins	777, 182	976, 412	974, 959	1, 204, 683	229, 724	
Johnson	6, 762	9, 541	12, 216	12, 464	248	
Knox	217, 040	158, 445	281, 575	235, 682		45, 893
Laurel	288, 494	364, 307	288, 478	349, 719	61, 241	
Lawrence	47, 474	48, 061	59, 600	49, 418		10, 182
Lee	9, 847	35, 711	25, 796	5, 300		20, 496
McLean	24, 076	33, 360	21, 725	29, 795	8, 070	
Muhlenberg	256, 268	270, 760	317, 392	414, 332	96, 940	
Ohio	368, 094	466, 295	440, 011	505, 913	65, 902	
Pulaski	72, 537	47, 847	86, 770	103, 469	16, 699	
Rockcastle		12, 603				
Union	104, 122	126, 896	193, 665	185, 405		8, 260
Webster	50, 538	65, 982	55, 850	122, 391	66, 541	
Whitley	428, 980	241, 891	387, 284	525, 317	138, 033	
Small mines ..	150, 000	150, 000	150, 000	150, 000		
Total ...	3, 333, 478	3, 602, 097	3, 887, 908	4, 607, 255	a 719, 347	

a Net increase.

MINERAL RESOURCES.

The production from the two fields in Kentucky during the past three years has been as follows:

Coal product of the eastern district of Kentucky in 1897, 1898, and 1899, exclusive of small mines.

County.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Bell.....	103, 261	85, 544	152, 934	67, 390	.....
Boyd.....	192, 538	208, 762	171, 438	.....	37, 324
Breathitt.....	10, 053	18, 440	15, 700	.....	2, 740
Carter.....	124, 346	63, 745	184, 784	121, 039	.....
Greenup.....	852	2, 500	4, 225	1, 725	.....
Johnson.....	9, 541	12, 216	12, 464	248	.....
Knox.....	158, 445	281, 575	235, 682	.....	45, 893
Laurel.....	364, 307	288, 478	349, 719	61, 241	.....
Lawrence.....	48, 061	59, 600	49, 418	.....	10, 182
Lee.....	35, 711	25, 796	5, 300	.....	20, 496
Pulaski.....	47, 847	86, 770	103, 469	16, 699	.....
Rockcastle.....	12, 603	.....	.....	.....	.....
Whitley.....	241, 891	387, 284	525, 317	138, 033	.....
Total.....	1, 349, 456	1, 520, 710	1, 810, 450	a 289, 740	.....

a Net increase.

Coal product of the western district of Kentucky in 1897, 1898, and 1899, exclusive of small mines.

County.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Butler.....	21, 847	34, 114	35, 174	1, 060	.....
Christian.....	13, 000	66, 496	.....	.....	66, 496
Daviess.....	3, 200	17, 141	2, 464	.....	14, 677
Hancock.....	17, 702	9, 450	10, 020	570	.....
Henderson.....	107, 187	86, 395	136, 628	50, 233	.....
Hopkins.....	976, 412	974, 959	1, 204, 683	229, 724	.....
McLean.....	33, 360	21, 725	29, 795	8, 070	.....
Muhlenberg.....	270, 760	317, 392	414, 332	96, 940	.....
Ohio.....	466, 295	440, 011	505, 913	65, 902	.....
Union.....	126, 896	193, 665	185, 405	.....	8, 260
Webster.....	65, 982	55, 850	122, 391	66, 541	.....
Total.....	2, 102, 641	2, 217, 198	2, 646, 805	a 429, 607	.....

a Net increase.

The development of the coal-mining industry in Kentucky since 1873 may be seen from the following table:

Annual coal product of Kentucky since 1873.

Year.	Short tons.	Year.	Short tons.
1873.....	300,000	1887.....	1,933,185
1874.....	360,000	1888.....	2,570,000
1875.....	500,000	1889.....	2,399,755
1876.....	650,000	1890.....	2,701,496
1877.....	850,000	1891.....	2,916,069
1878.....	900,000	1892.....	3,025,313
1879.....	1,000,000	1893.....	3,007,179
1880.....	1,000,000	1894.....	3,111,192
1881.....	1,100,000	1895.....	3,357,770
1882.....	1,300,000	1896.....	3,333,478
1883.....	1,650,000	1897.....	3,602,097
1884.....	1,550,000	1898.....	3,887,908
1885.....	1,600,000	1899.....	4,607,255
1886.....	1,550,000		

MARYLAND.

Total product in 1899, 4,807,396 short tons; spot value, \$3,667,056.

There are only two coal-producing counties in Maryland—Allegany and Garrett—and 98 per cent of the product is from Allegany County. Notwithstanding the comparatively small area underlaid by coal in the State, Maryland has been an important coal producer for many years, and was one of the first States in the Union to produce bituminous coal. On account of the limited extent of its coal fields it is not to be expected that the coal product of Maryland will increase in the same proportion as that of other and more recently developed fields, but it is interesting to note that the tonnage from the State has increased each year since 1894, and that the product in 1899 was 132,512 short tons larger than that of 1898, with an increase in value of \$134,799. The average price remained unchanged.

Machine undercutting was introduced into the mines of Maryland in 1899 for the first time. Up to the close of 1898 the miners of Maryland had not been brought into direct competition with mechanical mining, but in 1899 two companies installed machines, eight in all, and all of the pick or punching type. The tonnage won by the machines, however, was not large, amounting in all to but 16,545 short tons. It is interesting, however, as noting the introduction of mechanical min-

ing methods into a field heretofore exclusively hand-worked. Only one mine reported labor strikes in 1899, 35 men being idle for twelve days.

Coal product of Maryland since 1889.

Year.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889.....	2,885,336	44,217	10,162	2,939,715	\$2,517,474	\$0.86		3,702
1890.....	3,296,393	52,621	8,799	3,357,813	2,899,572	.86	244	3,842
1891.....	3,771,584	36,959	11,696	3,820,239	3,082,515	.80	244	3,891
1892.....	3,385,384	30,955	3,623	3,419,962	3,063,580	.89	225	3,886
1893.....	3,676,137	26,833	13,071	3,716,041	3,267,317	.88	240	3,935
1894.....	3,435,600	51,750	14,078	3,501,428	2,687,270	.77	215	3,974
1895.....	3,840,991	59,950	14,644	3,915,585	3,160,592	.81	248	3,912
1896.....	4,068,558	53,046	22,332	4,143,936	3,299,928	.80	204	4,039
1897.....	4,391,703	27,762	22,663	4,442,128	3,363,996	.76	262	4,719
1898.....	4,618,990	36,941	18,953	4,674,884	3,532,257	.76	253	4,818
1899.....	4,716,581	68,750	22,065	4,807,396	3,667,056	.76	275	4,624

Product of coal in Maryland from 1883 to 1899.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of men employed.
1883.....	2,476,075				
1884.....	2,765,617				
1885.....	2,833,337				
1886.....	2,517,577	\$2,391,698	\$0.95		
1887.....	3,278,023	3,114,122	.95		
1888.....	3,479,470	3,293,070	.95		
1889.....	2,939,715	2,517,474	.86		3,702
1890.....	3,357,813	2,899,572	.86	244	2,842
1891.....	3,820,239	3,082,515	.80	244	3,891
1892.....	3,419,962	3,063,580	.89	225	3,886
1893.....	3,716,041	3,267,317	.88	240	3,935
1894.....	3,501,428	2,687,270	.77	215	3,974
1895.....	3,915,585	3,160,592	.81	248	3,912
1896.....	4,143,936	3,299,928	.80	204	4,039
1897.....	4,442,128	3,363,996	.76	262	4,719
1898.....	4,674,884	3,532,257	.76	253	4,818
1899.....	4,807,396	3,667,056	.76	275	4,624

The records of the Cumberland coal field, embracing all the coal area in Maryland and what is known as the Piedmont or Upper Potomac field in West Virginia, have been carefully preserved since 1842 and are shown in the following table. The reports of the Cumberland coal trade are published annually and the statements of shipments shown on the following page are obtained from these reports. They show that since 1842 104,250,532 long tons, or 116,760,596 short tons, have been sent out of the region up to the close of 1899. Of this total, 86,793,327 long tons, or 97,208,526 short tons, were from the Maryland mines. Adding to this amount 2 per cent for local trade and colliery consumption, Maryland's product is found to have amounted to about 100,000,000 short tons.

1842	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1843	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1844	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1845	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1846	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1847	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1848	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1849	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1850	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1851	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1852	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1853	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1854	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1855	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1856	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1857	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1858	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1859	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1860	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1861	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1862	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1863	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1864	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1865	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1866	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1867	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1868	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1869	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1870	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1871	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1872	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1873	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1874	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1875	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1876	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1877	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1878	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1879	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878	71,745	117,796	287,126	384,237	692,938	623,031	669,115	1,016,777
1880	3,661	5,156	13,738	11,240	20,615	36,571	63,676	73,783	70,893	120,893	150,381	148,953	93,691	86,994	80,743	48,015	46,415	70,669	32,878								

[illegible]

a Includes 150,505 tons used on line of Cumberland and Pennsylvania Railroad and its branches and at Cumberland and Piedmont, also 536,913 tons used by the Baltimore and Ohio Railroad Company in locomotives, rolling mills, etc.

MICHIGAN.

Total product in 1899, 624,708 short tons; spot value, \$870,152.

With a coal product in 1899 98 per cent larger than the preceding year, Michigan easily outclassed all the other States in the percentage of increased tonnage. It is only in the past three years that the coal fields of Michigan have received any considerable attention. Up to the close of 1896 the operations had been confined to a few mines producing coal for the local trade of Saginaw, Jackson, and other towns in the vicinity. In 1897 2 new mines were opened and the product increased to 223,592 short tons from 92,882 tons in 1896. Four more mines were opened in 1898, bringing the total up to 17, and the product increased to 315,722 short tons. In 1899 the number of mines was increased to 23 and the product nearly doubled. This rapid increase in production of Michigan coal may be taken as an indication of the rapid advancement in manufacturing industries in the lake cities contiguous to the Michigan fields.

The first machines were introduced into Michigan mines in 1898, one company installing 7 machines and producing with them 1,456 tons. In 1899 4 concerns were using 25 machines and the machine-mined coal amounted to 64,055 tons, 10 per cent of the total product.

The production in Michigan by counties for the past two years was as follows:

Coal product of Michigan in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bay.....	2	45,601	49,944	1,268	96,813	\$127,121	\$1.31	285	175
Eaton.....	4		5,936	10	5,946	10,596	1.78	149	29
Genesee.....	2	12,775	1,715	1,550	16,040	21,345	1.33	199	48
Huron.....									
Jackson.....	2	24,000	14,104	2,287	40,391	64,092	1.59	261	110
Saginaw.....	5	123,867	405	630	124,902	192,112	1.54	237	246
Shiawassee.....	2	25,912	3,518	2,200	31,630	47,445	1.50	207	107
Total.....	17	232,155	75,622	7,945	315,722	462,711	1.47	245	715

Coal product of Michigan in 1899, by counties.

County.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Aver- age num- ber of em- ployees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bay.....	7	98,080	1,603	4,905	104,588	\$138,602	\$1.33	155	311
Eaton	4	1,100	2,317	4	3,421	6,710	1.96	145	26
Jackson	2	.....	20,476	1,124	21,600	38,860	1.80	210	77
Saginaw	6	441,459	4,844	9,304	455,607	624,354	1.37	274	742
Genesee	4	33,641	4,951	900	39,492	61,626	1.56	209	135
Huron.....									
Shiawassee ..									
Total	23	574,280	34,191	16,237	624,708	870,152	1.39	232	1,291

The following tables show the distribution of the product during the past eight years and the total product of the State since 1877:

Coal product of Michigan for eight years.

Year.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Aver- age num- ber of em- ployees.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1892.....	27,200	45,180	5,610	77,990	\$121,314	\$1.56	230	195
1893.....	27,787	16,367	1,825	45,979	82,462	1.79	154	162
1894.....	60,817	7,055	2,150	70,022	103,049	1.47	224	223
1895.....	80,403	27,019	4,900	112,322	180,016	1.60	186	320
1896.....	83,150	6,547	3,185	92,882	150,631	1.62	157	320
1897.....	188,636	24,686	10,270	223,592	325,416	1.46	230	537
1898.....	232,155	75,622	7,945	315,722	462,711	1.47	245	715
1899.....	574,280	34,191	16,237	624,708	870,152	1.39	232	1,291

Coal product of Michigan from 1877 to 1899.

Year.	Short tons.	Year.	Short tons.
Previous to 1877	350,000	1888.....	81,407
1877.....	69,197	1889.....	67,431
1878.....	85,322	1890.....	74,977
1879.....	82,015	1891.....	80,307
1880.....	129,053	1892.....	77,990
1881.....	130,130	1893.....	45,979
1882.....	135,339	1894.....	70,022
1883.....	71,296	1895.....	112,322
1884.....	36,712	1896.....	92,882
1885.....	45,178	1897.....	223,592
1886.....	60,434	1898.....	315,722
1887.....	71,461	1899.....	624,708

MISSOURI.

Total product in 1899, 3,025,814 short tons; spot value, \$3,591,945.

While Missouri's coal-mining industry shared in the general prosperity of 1899 and developed a product larger by 337,493 short tons than that of 1898 and larger than in any of the past ten years, there were three years in the earlier history of the State in which a heavier tonnage was obtained than that of last year. The banner year was 1888, when Missouri's mines were credited with a product of 3,909,967 short tons. The tonnage made in 1885 and 1887 was also larger than that of 1899. After the spurt of 1888 the production fell off to a marked extent, and for the next ten years remained quite steady at an average of about 2,600,000 tons a year. During these ten years the smallest output was made in 1894 (2,245,039 short tons) and the largest in 1893 (2,897,442 short tons). Coal production in Missouri is not apt to show any notable increase in the near future. The State is surrounded by other large coal-producing States, and most of the larger Missouri cities draw their fuel supply from mines outside the State's boundaries. Practically all of the soft coal used in St. Louis and other cities in the eastern part of the State is imported from Illinois or Kentucky. Iowa on the north, Kansas on the west, and Arkansas and the Indian Territory to the south and southwest complete a barrier around the State which confines the product of Missouri to local markets.

Machine mining has not shown much progress in Missouri, although several machines were introduced last year. Up to 1899 only one mine in the State was equipped with machines. During 1899 2 more mines installed machines, and brought the number of machines in use from 4 up to 9. Eight of these are of the Sperry type of long wall machine, and the other a "Paynter" air pick. The product won by the machines in 1899 was only 2,290 tons more than in 1898, the newly installed machines being in operation for only a short time in 1899.

Labor strikes occurred in 30 different mines during 1899. The total number of men on strike was 2,197, and the average time lost for each man was 53 days, or a total for all of 117,076 working days—about 7½ per cent of the working time made in all the mines.

The details of production in the last two years are presented in the following tables:

Coal product of Missouri in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Adair.....	3	78,606	145	1,045	74,796	\$75,579	\$1.01	207	230
Audrain.....	3	27,200	3,066	710	30,976	35,702	1.15	237	77
Barton.....	5	68,010	6,294	1,247	70,551	84,411	1.20	293	164
Bates.....	13	308,798	4,815	5,365	318,973	285,111	.89	150	606
Boone.....	3	7,900	5,519	360	13,779	15,960	1.16	177	48
Callaway.....	9	.....	21,210	5	21,215	33,036	1.56	178	86
Grundy.....	2	31,691	6,050	1,791	39,532	68,247	1.73	223	173
Henry.....	15	29,638	9,392	52	39,082	54,191	1.39	180	207
Lafayette.....	24	279,855	18,007	3,204	301,066	399,918	1.33	168	1,001
Linn.....	5	59,726	7,979	938	68,643	100,931	1.47	182	241
Macon.....	11	723,596	4,283	14,534	742,413	638,510	.86	227	1,465
Putnam.....	4	114,900	392	1,767	117,059	122,122	1.04	236	365
Randolph.....	7	242,222	9,143	2,193	253,558	254,806	1.00	223	581
Ray.....	9	195,095	12,481	3,385	210,961	265,845	1.26	192	690
Vernon.....	4	174,703	2,066	4,548	181,337	168,941	.93	114	342
Caldwell and Cole...	2	22,000	4,000	1,000	27,000	41,000	1.52	222	102
Jackson and Johnson	2	31,900	8,600	3,200	48,700	69,325	1.59	223	126
Livingston, Montgomery, and Ralls.	3	7,480	6,200	.....	13,680	17,639	1.29	233	39
Small mines.....	.....	.....	120,000	.....	120,000	140,000	.....	.....	.....
Total.....	124	2,393,315	249,662	45,344	2,688,321	2,871,296	1.07	198	6,542

MINERAL RESOURCES.

Coal product of Missouri in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Adair.....	5	172,677	1,265	1,510	175,452	\$199,846	\$1.14	248	345
Audrain.....	5	20,865	24,539	503	45,907	61,263	1.33	211	118
Barton.....	7	107,256	2,112	2,100	111,468	144,771	1.30	260	249
Bates.....	16	446,387	7,340	3,070	456,797	432,778	.95	210	595
Boone.....	5	3,760	16,130	390	20,280	25,500	1.26	226	53
Caldwell.....	2	35,400	10,500	2,200	48,100	71,900	1.50	236	115
Callaway.....	9		23,193	17	23,210	39,165	1.69	177	76
Grundy.....	2	33,539	6,770	1,762	42,071	74,859	1.78	212	176
Henry.....	19	86,844	8,011	216	95,071	142,505	1.50	198	322
Lafayette.....	36	342,770	21,433	5,050	369,253	565,470	1.53	195	1,118
Linn.....	6	70,321	13,553	1,054	84,928	132,782	1.56	235	272
Macon.....	14	520,182	5,312	14,049	539,543	523,003	.97	202	1,438
Montgomery.....	2	475	1,372	8	1,855	2,604	1.40	229	7
Putnam.....	5	131,679	526	2,450	134,655	161,028	1.20	270	372
Ralls.....	2	22,040	500	100	22,640	27,710	1.22	296	60
Randolph.....	10	294,775	8,907	1,280	304,962	300,260	.98	214	703
Ray.....	10	198,536	4,992	3,094	206,622	282,399	1.37	193	705
Vernon.....	6	179,427	1,585	4,202	185,214	177,463	.96	167	313
Cole, Howard, and Livingston.....	3	2,500	1,786		4,286	9,564	2.23	196	19
Jackson and Johnson.....	2	22,000	10,000	1,500	33,500	77,075	2.30	251	80
Small mines.....			120,000		120,000	140,000			
Total.....	166	2,691,433	289,826	44,555	3,025,814	3,591,945	1.20	212	7,136

Distribution of the coal product of Missouri from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889.....		2,246,845	275,999	34,979	2,557,823	\$3,479,057	\$1.36		
1890.....		2,449,305	240,237	45,679	2,735,221	3,382,858	1.24	229	5,971
1891.....		2,350,707	265,595	58,304	2,674,606	3,283,242	1.23	218	6,199
1892.....		2,399,605	293,414	40,930	2,733,949	3,369,659	1.23	230	5,893
1893.....		2,525,227	322,754	49,461	2,897,442	3,562,757	1.23	206	7,375
1894.....	149	1,955,255	242,501	47,283	2,245,039	2,634,564	1.17	138	7,523
1895.....	124	2,104,452	231,090	36,851	2,372,393	2,651,612	1.12	163	6,299
1896.....	123	2,047,251	243,029	41,262	2,331,542	2,518,194	1.08	168	5,982
1897.....	105	2,884,797	239,686	41,143	2,665,626	2,887,884	1.08	168	6,414
1898.....	124	2,393,315	249,662	45,344	2,688,321	2,871,296	1.07	196	6,542
1899.....	166	2,691,433	289,826	44,555	3,025,814	3,591,945	1.20	212	7,136

In the following table is shown the county distribution of the product during the past four years, with the increases and decreases in 1899 as compared with 1898. There were five counties in which the product decreased, Macon being the principal loser, with a falling off of 202,870 short tons. The principal increases were in Bates and Adair counties, the former with 137,824 and the latter with 100,656 short tons. The net increase in the State was 337,493 short tons.

Coal product of Missouri since 1896, by counties.

[Short tons.]

County.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
Adair	25,738	33,811	74,796	175,452	100,656	.....
Audrain	21,857	45,972	30,976	45,907	14,931	.....
Barton	13,731	54,400	70,551	111,468	40,917	.....
Bates	452,435	335,778	318,973	456,797	137,824	.....
Boone	14,751	9,180	13,779	20,280	6,501	.....
Caldwell	21,800	40,800	25,000	48,100	23,100	.....
Callaway	40,709	29,118	21,215	23,210	1,995	.....
Cole .....	.....	2,500	2,000	2,500	500	.....
Cooper .....	.....	.....	.....	.....	.....	.....
Grundy	34,602	40,508	39,532	42,071	2,539	.....
Henry	35,505	44,276	39,082	95,071	55,989	.....
Jackson	27,960	17,674	40,000	32,000	.....	8,000
Johnson	200	.....	3,700	1,500	.....	2,200
Lafayette	258,177	325,798	301,066	369,253	68,187	.....
Linn	64,504	81,598	68,643	84,928	16,285	.....
Livingston	706	.....	4,500	1,150	.....	3,350
Macon	459,778	573,556	742,413	539,543	.....	202,870
Moniteau	250	.....	.....	.....	.....	.....
Montgomery	12,106	19,865	1,200	1,855	655	.....
Morgan	200	6,000	.....	.....	.....	.....
Pettis .....	.....	800	.....	.....	.....	.....
Putnam	87,740	102,922	117,059	134,655	17,596	.....
Ralls	10,628	8,700	7,980	22,640	14,660	.....
Randolph	255,713	311,099	253,558	304,962	51,404	.....
Ray	129,356	182,240	210,961	206,622	.....	4,339
Saline	400	.....	.....	.....	.....	.....
St. Clair	80	.....	.....	.....	.....	.....
Vernon	242,616	279,031	181,337	185,214	3,877	.....
Other counties and small mines	120,000	120,000	120,000	120,636	636	.....
Total	2,331,542	2,665,626	2,688,321	3,025,814	a 337,493	.....

a Net increase.

The annual production since 1873 has been as follows:

Coal product of Missouri since 1873.

Year.	Short tons.	Year.	Short tons.
1873.....	784, 000	1887.....	3, 209, 916
1874.....	789, 680	1888.....	3, 909, 967
1875.....	840, 000	1889.....	2, 557, 823
1876.....	1, 008, 000	1890.....	2, 735, 221
1877.....	1, 008, 000	1891.....	2, 674, 606
1878.....	1, 008, 000	1892.....	2, 773, 949
1879.....	1, 008, 000	1893.....	2, 897, 442
1880.....	1, 680, 000	1894.....	2, 245, 039
1881.....	1, 960, 000	1895.....	2, 372, 393
1882.....	2, 240, 000	1896.....	2, 331, 542
1883.....	2, 520, 000	1897.....	2, 665, 626
1884.....	2, 800, 000	1898.....	2, 688, 321
1885.....	3, 080, 000	1899.....	3, 025, 814
1886.....	1, 800, 000		

MONTANA.

Total product in 1899, 1,496,451 short tons; spot value, \$2,347,757.

Montana's coal product in 1899 increased but slightly over 1898 and did not reach the tonnage won in any of the three years preceding 1898. From 1887 to 1897 the coal product of Montana increased without exception each year. A decrease was noted for the first time in eleven years by the falling off in 1898, the bulk of which loss was borne by Cascade County. Cascade County showed a decrease also in 1899, but this was more than made up by increases in Carbon County.

In proportion to the amount of coal mined, Montana stands at the head in the use of mining machines, nearly 60 per cent of the total product being won by mechanical means. There were five concerns using machines in 1899, a gain of one over 1898; the number of machines in use increased from 62 to 75, and the machine-won product increased from 681,613 to 843,710 short tons.

A strike which lasted fifty-two days, during the spring of 1899, occurred at the mines of the Anaconda Copper Company, in Cascade County. The number of men made idle was 650. This was the only instance of labor disaffection reported during the year.

The production by counties in 1898 and 1899, together with the distribution of the product for consumption, and the statistics of labor employed, are shown in the following tables:

Coal product of Montana in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Carbon.....	2	264,176	3,920	4,300	.....	272,396	\$393,884	\$1.45	270	410
Cascade.....	8	920,122	14,227	18,994	40,478	988,821	1,523,982	1.54	209	1,481
Choteau.....	11	140	6,357	40	.....	6,537	15,587	2.38	104	25
Fergus.....	4	.....	950	.....	.....	950	2,887	2.46	143	12
Gallatin.....	2	60,926	2,400	300	.....	63,626	102,712	1.61	246	102
Park.....	6	16,400	1,870	752	128,632	147,154	284,970	1.94	185	323
Dawson.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lewis and Clarke.....	3	50	269	.....	.....	319	785	2.46	44	6
Meagher.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	36	1,261,814	29,493	19,386	169,110	1,479,803	2,324,207	1.57	216	2,359

Coal product of Montana in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Carbon.....	4	318,451	7,174	11,900	.....	337,525	\$456,518	\$1.35	310	490
Cascade.....	8	881,837	9,790	18,849	54,902	965,378	1,522,700	1.58	212	1,496
Choteau.....	10	1,550	5,335	.....	.....	6,885	18,143	2.64	118	33
Fergus.....	3	.....	900	.....	.....	900	2,700	3.00	138	8
Park.....	4	41,000	3,350	1,500	83,000	128,850	262,062	2.03	270	251
Gallatin.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granite.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lewis and Clarke.....	5	51,776	3,137	2,000	.....	56,913	85,634	1.50	227	100
Meagher.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	34	1,294,614	29,686	34,249	137,902	1,496,451	2,347,757	1.57	238	2,378

The distribution of the product for consumption during the past eleven years, and by counties for the past four years, are given below:

Distribution of the coal product of Montana from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889..		314,372	12,917	5,436	30,576	363,301	\$80,778	\$2.42		
1890..		466,016	23,427	4,034	24,000	517,477	1,252,492	2.42		1,251
1891..		501,503	5,395	6,438	28,525	541,861	1,228,630	2.27		1,119
1892..		521,521	4,866	1,849	36,412	564,648	1,330,847	2.36	258	1,158
1893..		789,516	27,063	17,960	57,770	892,309	1,772,116	1.99	242	1,401
1894..	26	861,171	12,900	17,324	36,000	927,395	1,887,390	2.04	192	1,782
1895..	22	1,404,862	19,168	20,463	59,700	1,504,193	2,850,906	1.89	223	2,184
1896..	21	1,314,873	27,476	17,676	183,420	1,543,445	2,279,672	1.47	234	2,335
1897..	22	1,434,858	29,707	18,410	164,907	1,647,882	2,897,408	1.76	252	2,337
1898..	36	1,261,814	29,493	19,386	169,110	1,479,803	2,324,207	1.57	216	2,359
1899..	34	1,294,614	29,686	34,249	137,902	1,496,451	2,347,757	1.57	238	2,378

Product and value of Montana coal since 1896, by counties.

County.	1896.		1897.		1898.	
	Product.	Value.	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>		<i>Short tons.</i>	
Carbon	235,328	\$424,205	245,761	\$360,818	272,396	\$393,884
Cascade	1,101,298	1,473,532	1,138,590	1,999,104	988,821	1,523,932
Choteau	5,051	18,915	4,845	12,340	6,587	15,587
Fergus					950	2,337
Gallatin	108,460	214,535	132,413	223,024	63,626	102,712
Dawson			2,800	6,250		
Lewis and Clarke	56	250			319	785
Meagher	120	360	584	1,800		
Park	93,132	147,875	122,889	294,072	147,154	284,970
Total	1,543,445	2,279,672	1,647,882	2,897,408	1,479,803	2,324,207

County.	1899.		Increase, 1899.		Decrease, 1899.	
	Product.	Value.	Product.	Value.	Product.	Value.
	<i>Short tons.</i>		<i>Short tons.</i>		<i>Short tons.</i>	
Carbon	337,525	\$456,518	65,129	\$62,634		
Cascade	965,378	1,522,700			23,443	\$1,232
Choteau	6,885	18,143	348	2,556		
Fergus	900	2,700		363	50	
Gallatin	56,671	84,961			6,955	17,751
Dawson, Meagher, and Lewis and Clarke	242	673			77	112
Park	128,850	262,062			18,304	22,908
Total	1,496,451	2,347,757	16,648	23,550		

a Net increase.

Since 1883 the total product of the State has been as follows:

Coal product of Montana since 1883.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1883....	19,795	.....	1892....	564,648	\$1,330,847
1884....	80,376	.....	1893....	892,309	1,772,116
1885....	86,440	.....	1894....	927,395	1,887,390
1886....	49,846	.....	1895....	1,504,193	2,850,906
1887....	10,202	.....	1896....	1,543,445	2,279,672
1888....	41,467	.....	1897....	1,647,882	2,897,408
1889....	363,301	.....	1898....	1,479,803	2,324,207
1890....	517,477	\$1,252,492	1899....	1,496,451	2,347,757
1891....	541,861	1,228,630			

NEBRASKA.

The southwestern corner of Nebraska contains a portion of the western coal field, but the veins of coal being on the edge of the field are pinched to thin seams, varying from 6 to 22 inches. Some coal has been taken out for local consumption, but with the development of the fields of Iowa, Kansas, and Missouri, more favored both as to quality and conditions for economical mining, and with the operators of these mines seeking a market for their surplus product, such little work as has been done on Nebraska coal deposits has been practically abandoned. A small amount (3,560 short tons) was mined in Dixon County in 1896, all of which was consumed locally. The product in 1897 fell off to 495 tons, and no output was obtained in 1898 nor 1899.

NEVADA.

No product has been reported from this State since 1894, when a small amount (150 short tons) was mined in Esmeralda County.

NEW MEXICO.

Total production in 1899, 1,050,714 short tons; spot value, \$1,461,865.

Compared with 1898 the product of New Mexico in 1899 shows an increase of 58,426 short tons, and reaches a total exceeding a million tons for the first time in the history of the Territory. The value increased in slightly greater proportion than the product, or \$117,115. There was an advance of 4 cents in the average price per ton.

Two interesting features of coal mining in New Mexico in 1899 are that no strikes at all were reported, and that there was a largely increased tonnage by machines, while the machines reported were reduced one-half in number. The number of machines were reduced from 29 to 14, and the amount mined by them was increased from 163,849 tons in 1898 to 260,773 tons in 1899.

The details of production in the past two years have been as follows:

Coal product of New Mexico in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bernalillo ...	8	441,123	1,580	2,855	.....	445,558	\$625,052	\$1.40	234	919
Colfax.....	3	248,173	4,577	4,341	17,124	269,215	320,443	1.19	259	408
Rio Arriba....	5	265,607	1,503	10,405	.....	277,515	399,255	1.44	245	546
San Juan.....										
Santa Fe.....										
Total ..	16	949,903	7,660	17,601	17,124	992,288	1,344,750	1.35	242	1,873

Coal product of New Mexico in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Bernalillo ...	8	488,400	1,602	3,308	493,310	\$696,666	\$1.41	247	852
Colfax.....	3	356,080	8,134	4,159	368,373	439,984	1.19	294	412
Lincoln	2	8,837	3,582	318	12,737	24,888	1.95	112	133
Rio Arriba....	5	168,484	810	7,000	176,294	300,377	1.70	292	353
San Juan.....									
Santa Fe.....									
Socorro.....									
Total ..	18	1,021,801	14,128	14,785	1,050,714	1,461,865	1.39	257	1,750

Distribution of the coal product of New Mexico from 1889 to 1899.

Year.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Aver- age num- ber of em- ployees.
		Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
1889.....		466,127	8,953	6,383	6,000	486,463	\$870,468	\$1.79		
1890.....		358,332	11,360	6,085		375,777	504,390	1.34	192	827
1891.....		448,612	3,471	6,245	4,000	462,328	779,018	1.68	265	806
1892.....		645,557	8,776	6,997		661,330	1,074,601	1.62	223	1,083
1893.....		636,002	5,618	8,776	14,698	665,094	979,044	1.47	229	1,011
1894.....	20	561,523	8,266	14,365	13,042	597,196	935,857	1.57	182	985
1895.....	22	695,634	13,045	11,292	683	720,654	1,072,520	1.49	190	1,383
1896.....	16	607,319	6,677	7,446	1,184	622,626	930,381	1.49	172	1,559
1897.....	15	689,423	7,844	19,714		716,981	991,611	1.38	208	1,659
1898.....	16	949,908	7,660	17,601	17,124	992,288	1,344,750	1.35	242	1,873
1899.....	18	1,021,801	14,128	14,785		1,050,714	1,461,865	1.39	257	1,750

Coal product of New Mexico since 1896, by counties.

[Short tons.]

County.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
Bernalillo	271,137	332,488	445,558	493,310	47,752	.....
Colfax	179,415	163,463	269,215	368,373	99,158	.....
Lincoln	2,535	75	.....	12,737	12,737	.....
Rio Arriba.....	8,200	a12,300	31,000	32,000	1,000	.....
Santa Fe.....	a161,339	208,655	246,215	137,534	.....	108,681
Other counties .....	.....	.....	300	6,760	6,460	.....
Total.....	622,626	716,981	992,288	1,050,714	58,426	.....

a Including San Juan County. b Net increase.

Coal product of New Mexico since 1882.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1882.....	157,092	.....	1891.....	462,328	\$779,018
1883.....	211,347	.....	1892.....	661,330	1,074,251
1884.....	220,557	.....	1893.....	665,094	979,044
1885.....	306,202	\$918,606	1894.....	597,196	935,857
1886.....	271,285	813,855	1895.....	720,654	1,072,520
1887.....	508,034	1,524,102	1896.....	622,626	930,381
1888.....	626,665	1,879,995	1897.....	716,981	991,611
1889.....	486,943	872,628	1898.....	992,288	1,344,750
1890.....	375,777	504,390	1899.....	1,050,714	1,461,865

NORTH CAROLINA.

Total product in 1899, 26,896 short tons: total value, \$34,965.

The entire production of North Carolina in 1899, as for several years past, was from the Cumnock mines in Chatham County. The output in 1898 was reduced by a fire in the mines.

Coal product of North Carolina for nine years.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1891.....	1	18,780	600	975	20,335	\$39,635	\$1.93	254	80
1892.....	1	6,679			6,679	9,599	1.44	160	90
1893.....	1	15,000		2,000	17,000	25,500	1.50	80	70
1894.....	1	13,500	1,000	2,400	16,900	29,675	1.76	145	95
1895.....	3	23,400	600	900	24,900	41,350	1.66	226	61
1896.....	1	5,356	295	2,162	7,813	11,720	1.50	220	18
1897.....	1	21,280			21,280	27,000	1.34	215	51
1898.....	1	9,852	304	1,339	11,495	14,368	1.25		
1899.....	1	24,126	486	2,284	26,896	34,965	1.30	210	70

The history of coal mining in the State dates from 1889. The Egypt mines, now called the Cumnock, were opened in December of that year, and yielded 192 tons. Since that time the product annually has been as follows:

Coal product of North Carolina since 1889.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1889.....	192	\$451	1895.....	24,900	\$41,350
1890.....	10,262	17,864	1896.....	7,813	11,720
1891.....	20,355	39,635	1897.....	21,280	27,000
1892.....	6,679	9,599	1898.....	11,495	14,368
1893.....	17,000	25,500	1899.....	26,896	34,965
1894.....	16,900	29,675			

NORTH DAKOTA.

Total product in 1899, 98,809 short tons; spot value, \$117,500.

The product increased 14,914 short tons, or 15 per cent over 1898, and \$23,909, or about 25 per cent, in value. All the coals of North Dakota are lignite. The statistics of production are shown in the following tables:

Coal product of North Dakota in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.				
Burleigh.....	4	800	1,325	20	2,145	\$1,912	\$0.90	106	14
Emmons.....	2		560		560	1,368	2.44	118	4
Morton.....	3	12,420	500		12,920	12,756	.94	162	23
Stark.....	3	37,500	6,780	1,000	45,280	46,105	1.02	209	48
McLean.....	6	20,503	2,360	127	22,990	31,450	1.37	188	62
Ward.....									
Total.....	18	71,223	11,525	1,147	83,895	93,591	1.12	187	151

Coal product of North Dakota in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.				
Burleigh.....	5	500	1,050		1,550	\$1,395	\$0.90	93	10
Emmons.....	2		725		725	1,820	2.51	85	5
McLean.....	5		2,480		2,480	2,459	.99	147	9
Morton.....	4	17,400	1,400	50	18,850	19,190	1.02	153	30
Stark.....	2	22,700	4,200		26,920	28,015	1.04	191	29
Ward.....	7	37,131	10,913	240	48,284	64,621	1.34	154	127
Total.....	25	77,731	20,788	290	98,809	117,500	1.19	154	210

Distribution of the coal product of North Dakota from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.				
1889.....		18,610	10,297		28,907	\$41,431	\$1.43		
1890.....			30,000		30,000	42,000	1.40		
1891.....			30,000		30,000	42,000	1.40		
1892.....		38,000	2,725		40,725	39,250	.96	216	54
1893.....		47,968	1,612	50	49,630	56,250	1.13	193	88
1894.....	8	37,311	4,480	224	42,015	47,049	1.12	156	77
1895.....	8	35,380	3,617		38,997	41,646	1.07	143	62
1896.....	10	71,447	6,183	420	78,050	84,908	1.09	166	141
1897.....	20	65,032	10,458	1,756	77,246	83,803	1.08	168	170
1898.....	18	71,223	11,525	2,147	83,895	93,591	1.12	187	151
1899.....	25	77,731	20,788	290	98,809	117,500	1.19	154	210

Coal product of North Dakota since 1884.

Year.	Short tons.	Year.	Short tons.
1884.....	35,000	1892.....	40,725
1885.....	25,000	1893.....	49,630
1886.....	25,955	1894.....	42,015
1887.....	21,470	1895.....	38,997
1888.....	34,000	1896.....	78,050
1889.....	28,907	1897.....	77,246
1890.....	30,000	1898.....	83,895
1891.....	30,000	1899.....	98,809

OHIO.

Total product in 1899, 16,500,270 short tons; spot value, \$14,361,903.

Compared with 1898 the coal product of Ohio in 1899 shows an increase of 1,983,403 short tons, or 14 per cent. The increase in value was \$2,334,567, or 19 per cent, there being an advance in the average price in the State from 83 cents to 87 cents per ton. The production of 1899, both in tonnage and value, was the largest in the history of the State. Ohio stands fourth in tonnage among the coal-producing States, being preceded by Pennsylvania, Illinois, and West Virginia. When the value of the product is taken as a basis for comparison, Ohio stands third, the amount received by the Ohio operators in 1899 exceeding the value of the West Virginia product by more than \$2,300,000, whereas the tonnage of West Virginia was larger than Ohio's by 2,750,000. Ohio stands third also in the number of machines used in the mines and second in the amount of machine-mined coal, the corresponding positions being held by Illinois. The number of machines in use in Ohio during 1899 was 278 as compared with 440 in Illinois mines. The coal won by machines in Ohio in 1899 was 6,822,524 tons as against 6,085,312 tons in Illinois.

Ohio was almost entirely free from coal-mining strikes in 1899. Only fifteen mines reported labor troubles last year and in some of these only a portion of the employees were idle. The total number of men made idle because of strikes was 877, a little more than 3 per cent of all the employees; and the time lost amounted to 26,394 days, about one-half of one per cent of the total time made, and an average of 30 days' idleness for the strikers.

PRODUCTION BY COUNTIES.

The record for increased production in 1898 was made by Guernsey County, whose tonnage increased nearly 50 per cent, to 1,326,480 short tons from 910,554 short tons in 1897. This record was beaten by Hocking County in 1899, not only in tonnage but in percentage of increase. Hocking County, in 1899, produced 2,018,865 short tons, a gain of 749,079 tons, or 59 per cent, over the preceding year. In making this stride Hocking County steps over Athens, Guernsey, and Perry counties and becomes a close second to Jackson County, whose product in 1899 was 2,032,233 short tons, not quite 14,000 tons more than Hocking County. Jackson County, in addition to resuming first place, from which it was deposed in 1896, was second in increased tonnage in 1899, with a gain of 261,968 tons. Perry County's product decreased nearly 100,000 tons in a year of general improvement, and as a consequence that county drops from first to fourth place. Athens County remains in third place. Guernsey County is credited with an increase of 236,506 tons, the third in tonnage gain, but is forced from fourth to fifth place by the advance of Hocking County to first place. Belmont and Stark counties hold sixth and seventh places, respectively, the latter supplanting Tuscarawas County. Belmont's production in 1899 increased a little over 200,000 tons, and that of Stark County was augmented by a little less than that figure. The credit for the largest percentage of increase belongs to Trumbull County, whose output in 1899 exceeded that of 1898 by 362 per cent. Next to this was Washington County, with 181 per cent gain. Both counties, however, are small producers, their combined product in 1899 being less than 16,000 tons.

There were two counties in 1899 whose product exceeded 2,000,000 tons. They were Hocking and Jackson. Once before, in 1895, Jackson County passed that figure. No other county of the State ever has. Five other counties exceeded 1,000,000 tons in 1899, making seven counties whose product is given in seven figures. Tuscarawas and Jefferson counties each produced over 900,000 tons in 1899, and Columbiana County was less than 15,000 tons short of that figure. No other county produced as much as 400,000 tons.

Athens, Hocking, and Perry counties combined form what is known as the Hocking Valley region. The output of the three counties in 1899 amounted to 5,540,393 short tons, about one-third the total product of the State.

The details of production by counties in 1898 and 1899, together with the distribution of the product for consumption, are shown in the following tables:

Coal product of Ohio in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employes.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Athens	31	1,558,258	28,512	51,420	13,259	1,651,449	\$1,246,678	\$0.75	161	3,040
Belmont.....	32	912,113	121,766	2,223		1,036,102	752,542	.73	177	1,715
Carroll	8	222,711	7,160	915		230,786	172,268	.75	181	412
Columbiana..	20	862,183	20,435	11,062		893,680	673,000	.75	222	1,445
Coshocton...	19	351,119	15,813	360		367,292	332,592	.91	229	630
Guernsey.....	14	1,294,297	15,518	16,665		1,326,480	851,664	.65	234	1,700
Harrison.....	2	28,307	385	420		29,112	17,487	.60	174	84
Hocking.....	17	1,244,587	12,321	12,878		1,269,786	982,318	.73	142	2,258
Jackson.....	50	1,669,561	69,839	30,865		1,770,265	1,593,553	.90	145	4,215
Jefferson.....	22	668,222	126,485	4,749	1,084	800,540	641,079	.80	240	1,150
Lawrence.....	7	57,341	7,458	50		64,849	51,095	.79	119	223
Mahoning....	11	20,720	14,313	752		35,785	32,140	.90	175	109
Medina.....	10	232,613	10,350	6,243		249,406	267,943	1.07	196	770
Meigs.....	15	46,918	125,329	1,974		174,216	134,881	.77	117	540
Morgan.....	2	26,730				26,730	19,003	.71	101	90
Muskingum..	19	112,943	24,463	100		137,506	109,847	.80	164	327
Perry.....	56	1,761,724	30,573	39,678		1,831,975	1,494,885	.82	151	3,195
Portage.....	4	76,138	3,826	2,695		82,659	123,073	1.49	174	293
Stark.....	34	814,700	45,826	27,632		888,158	1,050,401	1.18	151	2,304
Summit.....	4	46,985	4,697	40		51,722	60,827	1.18	187	199
Trumbull....	3	1,275	265	100		1,640	2,869	1.75	40	29
Tuscarawas..	37	885,731	19,646	4,480		909,857	692,206	.76	163	1,765
Vinton.....	5	72,000	8,224	1,060		81,274	74,281	.91	187	241
Washington..	3	1,112	1,846			2,958	2,734	.92	151	17
Wayne.....	3	34,321	3,903	5,132		43,356	54,333	1.25	164	125
Gallia.....	3	50,623	7,231	1,430		59,284	43,688	.74	201	110
Noble.....										
Scioto.....										
Small mines.			500,000			500,000	600,000			
Total	431	13,053,427	1,226,184	222,918	14,343	14,516,867	12,027,336	.83	169	26,986

Coal product of Ohio in 1899 by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Athens	33	1,709,923	3,198	59,600	13,320	1,786,041	\$1,389,136	\$0.78	189	2,963
Belmont	38	1,044,282	194,123	3,978	.....	1,242,383	944,870	.76	234	1,837
Carroll	10	217,424	8,467	1,300	.....	227,191	181,235	.80	180	445
Columbiana	24	795,600	78,679	10,900	.....	885,179	820,930	.93	250	1,422
Coshocton	25	365,920	25,743	710	.....	392,373	355,888	.91	231	647
Guernsey	15	1,543,127	5,720	14,189	.....	1,562,966	1,061,453	.68	227	1,698
Harrison	2	.....	1,380	10	.....	1,390	1,354	.97	143	7
Hocking	12	1,995,844	14,141	8,880	.....	2,018,865	1,497,461	.74	182	2,565
Jackson	45	1,964,733	39,770	27,730	.....	2,032,233	2,131,422	1.05	184	3,894
Jefferson	26	782,228	134,170	6,776	1,040	924,214	707,648	.77	265	1,139
Lawrence	10	102,056	14,746	170	.....	116,972	110,125	.94	211	297
Mahoning	11	30,974	12,057	875	.....	43,906	45,543	1.04	198	107
Medina	9	175,571	10,400	5,380	.....	191,351	224,096	1.17	210	414
Meigs	14	168,745	102,878	2,107	.....	273,730	231,576	.85	218	546
Morgan	2	24,855	.....	50	.....	24,905	20,749	.83	120	75
Muskingum	19	85,784	56,561	300	.....	142,645	117,499	.82	200	338
Perry	49	1,617,377	89,896	28,215	.....	1,735,487	1,366,056	.79	166	2,799
Stark	35	1,009,568	45,302	24,358	.....	1,079,228	1,375,690	1.27	185	2,350
Summit	4	66,439	1,549	714	.....	68,702	86,564	1.26	150	233
Tuscarawas	37	932,284	41,856	5,291	.....	979,431	783,324	.80	202	1,583
Vinton	6	69,639	740	1,460	.....	71,839	70,204	.98	184	166
Washington	4	3,900	4,408	14	.....	8,322	8,322	1.00	139	27
Gallia	3	17,554	1,220	.....	.....	18,774	15,150	.81	207	39
Scioto .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gauga .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portage	6	108,472	4,774	7,407	.....	115,653	164,913	1.43	190	337
Trumbull .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Noble	2	58,594	1,248	1,628	.....	56,470	50,676	.90	221	115
Wayne .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Small mines .....	.....	.....	500,000	.....	.....	500,000	600,000	.....	.....	.....
Total	441	14,880,893	1,393,025	211,992	14,360	16,500,270	14,361,903	.87	200	26,038

Distribution of the coal product of Ohio from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889 .....	.....	8,566,223	1,196,872	144,223	69,469	9,976,787	\$9,355,400	\$0.94	.....	19,343
1890 .....	.....	10,161,887	1,164,876	143,984	23,759	11,494,506	10,783,171	.94	201	20,576
1891 .....	.....	11,393,209	1,281,568	140,420	53,486	12,868,683	12,106,115	.94	206	22,182
1892 .....	.....	11,995,256	1,411,642	117,486	38,543	13,562,927	12,722,745	.94	212	22,576
1893 .....	.....	11,713,116	1,348,743	167,002	24,785	13,253,646	12,351,189	.92	188	23,931
1894	374	10,636,402	1,101,940	123,397	45,117	11,909,856	9,841,723	.83	136	27,105
1895	415	11,993,686	1,227,224	152,277	42,619	13,365,806	10,618,477	.79	176	24,644
1896	408	11,494,275	1,181,610	172,722	26,595	12,875,202	10,253,461	.79	161	25,500
1897	350	10,725,047	1,259,290	192,755	19,850	12,196,942	9,535,409	.78	148	26,410
1898	431	13,058,427	1,226,184	222,913	14,343	14,516,867	12,027,336	.83	169	26,966
1899	441	14,880,893	1,393,025	211,992	14,360	16,500,270	14,361,903	.87	200	26,038

The production by counties for the past five years and the amount and per cent of increase or decrease in each county in 1899 as compared with 1898 are given below:

Coal product of Ohio since 1895, by counties.

[Short tons.]

County.	1895.	1896.	1897.	1898.	1899.	Increase, 1899.	De- crease, 1899.	Per cent of in- crease.	Per cent of de- crease.
Athens	1,433,226	1,398,141	1,153,642	1,651,449	1,786,041	134,592		8	
Belmont.....	846,643	919,076	827,420	1,036,102	1,242,383	206,281		19.9	
Carroll	260,879	289,117	147,931	230,786	227,191		3,595		1.6
Columbiana..	617,654	534,697	774,736	893,680	885,179		8,511		1
Coshocton....	207,620	359,379	343,589	367,292	392,373	25,081		6.8	
Gallia	12,900	2,080	13,802	11,488	13,536	2,048		17.8	
Guernsey.....	886,581	955,457	910,554	1,326,480	1,562,986	236,506		17.8	
Harrison	3,472	2,504	5,886	29,112	1,390		27,722		95.2
Hocking	1,587,985	1,415,468	1,411,907	1,269,786	2,018,865	749,079		59	
Jackson	2,005,384	1,629,226	1,662,651	1,770,265	2,032,233	261,968		14.8	
Jefferson	885,322	687,912	751,848	800,540	924,214	123,674		15.4	
Lawrence	88,502	51,597	87,340	64,849	116,972	52,123		80.4	
Mahoning....	42,482	24,693	37,287	35,785	43,906	8,121		22.7	
Medina	264,171	194,104	170,412	249,406	191,351		58,055		23.3
Meigs	184,076	259,386	184,197	174,216	273,730	99,514		57.7	
Morgan	16,000	16,294	21,965	26,730	24,905		1,825		6.8
Muskingum...	103,860	112,333	131,606	137,506	142,645	5,139		3.7	
Perry	1,711,944	1,722,572	1,596,199	1,831,975	1,735,487		96,488		5.3
Portage	86,576	48,377	79,237	82,659	108,006	25,349		30.6	
Stark	779,733	962,618	639,065	888,158	1,079,228	191,070		21.5	
Summit	25,606	23,470	52,173	51,722	68,702	16,980		32.8	
Trumbull	15,801	2,280	12,607	1,640	7,575	5,935		361.9	
Tuscarawas ..	667,094	641,087	626,972	909,857	979,431	69,574		7.6	
Vinton	18,005	39,439	54,005	81,274	71,839		9,435		11.6
Washington ..	3,489	3,320	2,130	2,958	8,322	5,364		181	
Wayne	110,801	55,438	61,773	43,356	13,754		29,602		68.3
Noble		25,137	37,008	47,796	48,024	228		.48	
Scioto									
Small mines.	500,000	500,000	500,000	500,000	500,000				
Total ..	13,355,806	12,875,202	12,196,942	14,516,887	16,500,270	2,083,403		13.66	

^aIncludes Geauga County

^bNet Increase.

Records of the total production of Ohio are available only since 1872, since which time the annual output has been as follows:

Annual coal product of Ohio since 1872.

Year.	Short tons.	Year.	Short tons.
1872.....	5,315,294	1886.....	8,435,211
1873.....	4,550,028	1887.....	10,300,708
1874.....	3,267,585	1888.....	10,910,951
1875.....	4,864,259	1889.....	9,976,787
1876.....	3,500,000	1890.....	11,494,506
1877.....	5,250,000	1891.....	12,868,683
1878.....	5,500,000	1892.....	13,562,927
1879.....	6,000,000	1893.....	13,253,646
1880.....	7,000,000	1894.....	11,909,856
1881.....	8,225,000	1895.....	13,355,806
1882.....	9,450,000	1896.....	12,875,202
1883.....	8,229,429	1897.....	12,196,942
1884.....	7,640,062	1898.....	14,516,867
1885.....	7,816,179	1899.....	16,500,270

OREGON.

Total product in 1899, 86,888 short tons; spot value, \$260,917.

The coal product of Oregon in 1899 was 28,704 short tons, or 49 per cent larger than in 1898, but did not attain the figures reported in 1896 or 1897. It was, however, larger than in any year prior to 1896. The Beaver Hill mine, about which much was promised and which helped to swell the total for 1896 and 1897, did not produce in 1897 or 1898.

The following tables show the statistics of production for the past eight years and the total output since 1885:

Coal product in Oregon since 1892.

Year.	Loaded at mines for ship-ment.	Sold to local trade and used by em-ployees.	Used at mines for steam and heat.	Total product.	Total value.	Average number of em-ployees.	Average number of days worked.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>			
1892.....	31,760	2,353	548	34,661	\$148,546	90	120
1893.....	37,835	3,594	254	41,683	164,500	110	192
1894.....	45,068	2,171	282	47,521	183,914	88	243
1895.....	68,108	5,294	283	73,685	247,901	414	a 69
1896.....	88,116	12,961	654	101,721	294,564	254	191
1897.....	92,921	5,207	9,161	107,289	291,772	375	200
1898.....	54,305	3,290	589	58,184	212,184	142	199
1899.....	78,608	6,656	1,624	86,888	260,917	124	238

a The apparently large number of men employed and small average working time are due to the large force of men employed in developing the Beaver Hill mine, which was producing coal for shipment during only twenty days in 1895. The average time made at the Newport mines was over two hundred days per man.

Coal product of Oregon from 1885 to 1899.

Year.	Short tons.	Year.	Short tons.
1885.....	50,000	1893.....	41,683
1886.....	45,000	1894.....	47,521
1887.....	37,696	1895.....	73,685
1888.....	75,000	1896.....	101,721
1889.....	64,359	1897.....	107,289
1890.....	61,514	1898.....	58,184
1891.....	51,826	1899.....	86,888
1892.....	34,661		

PENNSYLVANIA.

Total product in 1899, 120,150,160 long tons, or 134,568,180 short tons; spot value, \$144,389,921. Anthracite: Total product, 53,944,647 long tons, or 60,418,005 short tons; spot value, \$88,142,130. Bituminous: Total product, 66,205,513 long tons, or 74,150,175 short tons; spot value, \$56,247,791.

Compared with 1898 the total product of anthracite and bituminous coal in Pennsylvania in 1899 developed an increase of 14,303,931 long tons, or 16,020,403 short tons, in amount, and of \$25,622,796 in value. The increase of tonnage in Pennsylvania was not only larger than the total product of any other State except Illinois, West Virginia, and Ohio, but it was also larger than the combined product of any two States outside of the three mentioned. The increase in the value of Pennsylvania's product was larger than the total value of the product in any other one State and equal to nearly one-half of the total value of the combined product of Illinois, West Virginia, Ohio, and Alabama. The aggregate product of anthracite and bituminous coal in Pennsylvania in 1899 was 53 per cent of the total product in the United States. The increase in Pennsylvania's tonnage constituted 49 per cent of the total increase of coal production in 1899 over 1898. The total value of Pennsylvania's product was 56 per cent of the total value of all the coal produced in the United States in 1899, and the \$25,622,796 increase in the value of Pennsylvania coal was 53 per cent of the total increase in value.

Of the increased product in 1899, 6,281,572 long tons, or 7,035,361 short tons, and \$12,727,593 were in anthracite, and 8,022,359 long tons, or 8,985,042 short tons, and \$12,895,203 were credited to bituminous. From this it appears that 45 per cent of the increase in product was anthracite, 55 per cent bituminous, while the increase in value was nearly equally divided. There was an increase from \$1.75 to \$1.80 per long ton in the average price per ton for anthracite coal at the mines, and an advance from 67 cents to 76 cents per short ton in the selling price of Pennsylvania bituminous coal.

Pennsylvania so completely outranks every other producing State, having in the combined product of anthracite and bituminous coal in 1899 nearly six times the output of Illinois, which stands second, that comparisons are only of interest when drawn with reference to the ratio of Pennsylvania's output to that of the total in the United States or of the combined product of the other States. It is not possible to carry such comparisons back to an earlier date than 1880, owing to incomplete statistics in a number of the States. During 1880 the total output of coal in the United States was 63,822,830 long tons, or 71,481,569 short tons, of which Pennsylvania produced 42,437,242 long tons, or 47,529,711 short tons, or practically two-thirds of the total.

The product of Pennsylvania coal has always exceeded 50 per cent of the total product of the United States, the lowest percentage being 52, in 1884 and 1888. The average percentage for the twenty years from 1880 to 1899, inclusive, was 55. In the following table is shown the total product of Pennsylvania and the United States since 1880, with the percentage of the total produced by Pennsylvania in each year:

Product of Pennsylvania coal compared with total United States since 1880.

Year.	Total United States.	Pennsylvania.	Per cent of Pennsylvania to total.
	<i>Short tons.</i>	<i>Short tons.</i>	
1880.....	71,481,569	47,529,711	65
1881.....	85,881,030	54,320,018	63
1882.....	103,285,789	57,254,507	55
1883.....	115,212,125	62,488,190	54
1884.....	119,735,051	62,404,488	52
1885.....	110,957,522	62,137,271	56
1886.....	112,743,403	62,857,210	56
1887.....	129,975,557	70,372,857	54
1888.....	148,659,402	77,719,624	52
1889.....	141,229,514	81,719,059	58
1890.....	157,788,657	88,770,814	56
1891.....	168,566,668	93,453,921	55
1892.....	179,329,071	99,167,080	55
1893.....	182,352,774	98,038,267	54
1894.....	170,741,526	91,833,584	54
1895.....	193,117,530	108,216,565	56
1896.....	191,986,357	103,903,534	54
1897.....	200,221,665	107,029,654	53
1898.....	219,974,667	118,547,777	54
1899.....	253,739,992	134,568,180	53

The production of anthracite and bituminous coal is discussed separately in the subsequent pages. The paper on anthracite production, which will be found particularly interesting, has been prepared by Mr. William W. Ruley, of Philadelphia, chief of the Bureau of Anthracite Coal Statistics. Mr. Ruley is thoroughly familiar with the conditions affecting the anthracite trade, and has contributed this feature to this series of reports for a number of years.

PENNSYLVANIA ANTHRACITE.¹

The general commercial prosperity during the year 1899 was so great and of such recent date that it is unnecessary to call attention to it further than to say that the anthracite trade shared, if not to its proportional extent, at least largely, in the general improvement. This is the more noticeable in this industry for the reason that for three years previous to 1899 the superficial appearances rather indicated a lessening in the demand for anthracite as compared with a steady growth in the use of bituminous coal.

It was pointed out, however, in previous reports that these appearances were misleading and that the apparent falling off in the demand for anthracite was due partly to general industrial conditions and partly to extraordinary causes which had already ceased to exist and the influence of which was about exhausted. This extraordinary influence arose from the excessive tonnage during the year 1895, which amounted to 46,511,477 tons. As was well known by those conversant with the trade, there was not a demand for anthracite to warrant any such tonnage, and the year 1895 closed with a large stock of coal on hand and the trade more or less demoralized. These unsold stocks continued to be a menace to the market for a long time, affecting prices and causing all buyers to be skeptical as to the future stability of the trade. This tonnage also affected the production for the ensuing years, and with a curtailment of output in order to dispose of the surplus an appearance of a declining demand for anthracite was produced and largely believed in by a considerable portion of the trade.

The above discussion of the 1895 production can probably be best appreciated by an exhibit of the market shipments of anthracite for the three years preceding and succeeding that year:

1892	long tons..	41, 893, 320	1896	long tons..	43, 177, 485
1893	do.....	43, 089, 537	1897	do.....	41, 637, 864
1894	do.....	41, 391, 200	1898	do.....	41, 899, 751
	1895	long tons..	46, 511, 477		

In four of the seven years from 1892 to 1898, inclusive, the yearly tonnage did not reach 42,000,000 long tons, while in 1893 and 1896 it barely reached 43,000,000 tons, but in 1895 it was 3,500,000 tons

¹ By William W. Ruley, chief of the Bureau of Anthracite Coal Statistics.

greater than the latter figure. An output of 42,000,000 tons was probably a normal consumption for the beginning of this seven-year period, and it is also probable that at no time during this period was there a normal demand for more than 43,000,000 tons. It should be borne in mind, however, that in speaking of an average annual demand for anthracite it is not intended to be indicated that any such average could be adhered to, for the years of large production have occurred abruptly at intervals and have not been led up to by gradually increasing annual productions. This fact can be plainly seen from the table of annual shipments from 1820 to date, printed in another part of this report.

Leaving now the consideration of the effect of an abnormally large annual production on the shipments for succeeding years, it will be well to consider the general commercial conditions prevailing during the years immediately preceding 1899. While there was a steady improvement in general business, the great burst of industrial activity did not start until the latter part of 1898, and during the year 1899 the country reached the height of commercial prosperity. The coal industry is somewhat peculiar in that it is about the last to be affected by general depression and also the last to revive. This is especially so in respect to anthracite, it being so largely consumed for domestic purposes. However, the trade in 1899 plainly showed the effect of the generally improved conditions by the largest tonnage in its history and a demand which fully kept pace with the production.

That the large production in 1899 was in response to actual demand was proved by the general steadiness of prices and the small surplus stocks remaining at the close of the year, with the prospects for quite as large a trade during 1900. The marked contrast in this condition of affairs as compared with the large production and state of trade at the close of 1895 is so apparent that further comment is unnecessary.

It will be also readily seen that the contention of pessimists that the anthracite business was a declining one was not justified by the facts, and the belief expressed in previous reports that the anthracite industry would come in for at least a moderate share of the general improvement is plainly borne out by the condition of trade during the past year and the prospects for the future.

Of course, on the other hand, it must not be taken for granted that the anthracite production will continue indefinitely to show large yearly increases to anything like the extent of bituminous coal, as its field is much more limited than that of the latter coal. It will also, like all other great industries, show the effect of hard times when they come, but there can be no doubt that there is a good legitimate demand for anthracite coal, varying from year to year with the changing conditions surrounding it.

Passing now to a consideration of the statistics of production, it is to be noted that the total product of anthracite in 1899 amounted to

53,944,647 long tons, an increase over 1898 of 6,281,571 tons. Of this amount 47,823,241 tons were actually shipped to market, 1,144,609 tons sold to local trade, and 4,976,797 tons used for steam and heat at the mines.

In addition to the large increase of tonnage, the average value per ton at the mines increased about 5 cents, resulting in a total increase of \$12,727,593 for the marketable product. In computing the total value of product the amount of coal used at mines for steam and heat is not taken into consideration, as it is composed mostly of culm and small sizes for which no value is given.

Below is given a table showing the total product and value of same, with the number of persons employed and the average number of days worked for the last five years:

Production of anthracite coal from 1895 to 1899.

Year.	Total product.	Value at mines.	Average price per ton.	Number of persons employed.	Average number of days worked.
	<i>Long tons.</i>				
1895.....	51,785,122	\$82,019,272	\$1.72	142,917	196
1896.....	48,523,287	81,748,651	1.85	148,991	174
1897.....	46,974,715	79,301,954	1.85	149,557	150
1898.....	47,663,076	75,414,537	1.75	145,184	152
1899.....	53,944,647	88,142,130	1.80	139,608	173

From the above table it will be seen that the value of coal at the mines in 1899 exceeded the next largest year, that of 1895, by over \$6,000,000, there being an increase in the average price per ton of 8 cents, in addition to the increased production.

In the following tables are shown the details by counties of the production for the years 1898 and 1899:

Anthracite coal product in 1898 by counties.

	Total product.	Shipments.	Local trade.	Used at mines.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Susquehanna	400,857	375,121	7,736	18,000
Lackawanna	12,130,122	11,023,620	317,382	789,120
Luzerne	17,699,936	15,658,233	399,579	1,642,124
Carbon	1,465,877	1,224,449	41,662	199,766
Schuylkill	11,215,997	9,674,555	224,025	1,317,417
Columbia.....	582,222	529,330	9,703	43,189
Sullivan				
Northumberland	3,490,604	3,027,550	87,399	375,655
Dauphin.....	677,461	530,518	17,931	129,012
Total.....	47,663,076	42,043,376	1,105,417	4,514,283

Anthracite coal product in 1899 by counties.

	Total product.	Shipments.	Local trade.	Used at mines.
	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>	<i>Long tons.</i>
Susquehanna	620,067	566,181	8,886	45,000
Lackawanna	13,602,111	12,489,526	308,420	804,165
Luzerne	19,738,351	17,449,294	498,724	1,790,333
Carbon	1,683,825	1,474,304	23,654	185,867
Schuylkill	12,470,688	10,772,735	193,156	1,504,797
Columbia	775,283	728,824	8,606	37,853
Sullivan				
Northumberland....	4,337,129	3,772,561	83,248	481,320
Dauphin.....	717,193	569,816	19,915	127,462
Total.....	53,944,647	47,823,241	1,144,609	4,976,797

In the above tables the columns headed "Shipments" show the coal actually loaded into cars for shipment to market. Of these shipments a record has been kept from the beginning of the industry, and in the table given below the shipment for each year from 1820 to 1899, divided into the three general trade regions, are given.

Annual shipments from the Schuylkill, Lehigh, and Wyoming regions from 1820 to 1899.

Year.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.
1820...			365				365
1821...			1,073				1,073
1822...	1,480	39.79	2,240	60.21			3,720
1823...	1,128	16.23	5,823	83.77			6,951
1824...	1,567	14.10	9,541	85.90			11,108
1825...	6,500	18.60	28,393	81.40			34,893
1826...	16,767	34.90	31,280	65.10			48,047
1827...	31,360	49.44	32,074	50.56			63,434
1828...	47,284	61.00	30,232	39.00			77,516
1829...	79,973	71.35	25,110	22.40	7,000	6.25	112,083
1830...	89,984	51.50	41,750	23.90	43,000	24.60	174,734
1831...	81,854	46.29	40,966	23.17	54,000	30.54	176,820
1832...	209,271	57.61	70,000	19.27	84,000	23.12	363,271
1833...	252,971	51.87	123,001	25.22	111,777	22.91	487,749
1834...	226,692	60.19	106,244	28.21	43,700	11.60	376,636
1835...	339,508	60.54	131,250	23.41	90,000	16.05	560,758
1836...	432,045	63.16	148,211	21.66	103,861	15.18	684,117
1837...	530,152	60.98	223,902	25.75	115,387	13.27	869,441
1838...	446,875	60.49	213,615	28.92	78,207	10.59	738,697
1839...	475,077	58.05	221,025	27.01	122,300	14.94	818,402
1840...	490,596	56.75	225,313	26.07	148,470	17.18	864,379
1841...	624,466	65.07	143,037	14.90	192,270	20.03	959,773
1842...	583,273	52.62	272,540	24.59	252,599	22.79	1,108,412
1843...	710,200	56.21	267,793	21.19	285,605	22.60	1,263,598
1844...	887,937	54.45	377,002	23.12	365,911	22.43	1,630,850
1845...	1,131,724	56.22	429,453	21.33	451,836	22.45	2,013,013
1846...	1,308,500	55.82	517,116	22.07	518,389	22.11	2,344,005
1847...	1,665,735	57.79	633,507	21.98	583,067	20.23	2,882,309
1848...	1,733,721	56.12	670,321	21.70	685,196	22.18	3,089,238
1849...	1,728,500	53.30	781,556	24.10	732,910	22.60	3,242,966
1850...	1,840,620	54.80	690,456	20.56	827,823	24.64	3,358,899
1851...	2,328,525	52.34	964,224	21.68	1,156,167	25.98	4,448,916
1852...	2,636,835	52.81	1,072,136	21.47	1,284,500	25.72	4,993,471
1853...	2,665,110	51.30	1,054,309	20.29	1,475,732	28.41	5,195,151
1854...	3,191,670	53.14	1,207,186	20.13	1,603,478	26.73	6,002,334
1855...	3,552,943	53.77	1,284,113	19.43	1,771,511	26.80	6,608,567
1856...	3,603,029	52.91	1,351,970	19.52	1,972,581	28.47	6,927,580
1857...	3,373,797	50.77	1,318,541	19.84	1,952,603	29.39	6,644,941
1858...	3,273,245	47.86	1,380,030	20.18	2,186,094	31.96	6,839,369
1859...	3,448,708	44.16	1,628,311	20.86	2,731,236	34.98	7,808,255
1860...	3,749,632	44.04	1,821,674	21.40	2,941,817	34.56	8,513,123

Annual shipments from the Schuylkill, Lehigh, and Wyoming regions, etc.—Continued.

Year.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.
1861...	3,160,747	39.74	1,738,377	21.85	3,055,140	38.41	7,954,264
1862...	3,372,583	42.86	1,351,054	17.17	3,145,770	39.97	7,869,407
1863...	3,911,683	40.90	1,894,713	19.80	3,759,610	39.30	9,566,006
1864...	4,161,970	40.89	2,054,669	20.19	3,960,836	38.92	10,177,475
1865...	4,356,959	45.14	2,040,913	21.14	3,254,519	33.72	9,652,391
1866...	5,787,902	45.56	2,179,364	17.15	4,736,616	37.29	12,703,882
1867...	5,161,671	39.74	2,502,054	19.27	5,325,000	40.99	12,988,725
1868...	5,330,737	38.52	2,502,582	18.13	5,968,146	43.25	13,801,465
1869...	5,775,138	41.66	1,949,673	14.06	6,141,369	44.28	13,866,180
1870...	4,968,157	30.70	3,239,374	20.02	7,974,660	49.28	16,182,191
1871...	6,552,772	41.74	2,235,707	14.24	6,911,242	44.02	15,699,721
1872...	6,694,890	34.03	3,873,339	19.70	9,101,549	46.27	19,669,778
1873...	7,212,601	33.97	3,705,596	17.46	10,309,755	48.57	21,227,952
1874...	6,866,877	34.09	3,773,836	18.73	9,504,408	47.18	20,145,121
1875...	6,281,712	31.87	2,834,605	14.38	10,596,155	53.75	19,712,472
1876...	6,221,934	33.63	3,854,919	20.84	8,424,158	45.53	18,501,011
1877...	8,195,042	39.35	4,332,760	20.80	8,300,377	39.85	20,828,179
1878...	6,282,226	35.68	3,237,449	18.40	8,085,587	45.92	17,605,262
1879...	8,960,829	34.28	4,595,567	17.58	12,586,293	48.14	26,142,689
1880...	7,554,742	32.23	4,463,221	19.05	11,419,279	48.72	23,437,242
1881...	9,253,958	32.46	5,294,676	18.58	13,951,383	48.96	28,500,017
1882...	9,459,288	32.48	5,689,437	19.54	13,971,371	47.98	29,120,096
1883...	10,074,726	31.69	6,113,809	19.23	15,604,492	49.08	31,793,027
1884...	9,478,314	30.85	5,562,226	18.11	α 15,677,753	51.04	30,718,293
1885...	9,488,426	30.01	5,898,634	18.65	α 16,236,470	51.34	31,623,530
1886...	9,381,407	29.19	5,723,129	17.89	α 17,031,826	52.82	32,136,362
1887...	10,609,028	30.63	4,347,061	12.55	α 19,684,929	56.82	34,641,018
1888...	10,654,116	27.93	5,639,236	14.78	α 21,852,366	57.29	38,145,718
1889...	10,486,185	29.28	6,294,073	17.57	α 19,036,835	53.15	35,817,093
1890...	10,867,822	29.68	6,329,658	17.28	α 19,417,979	53.04	36,615,459
1891...	12,741,258	31.50	6,381,838	15.78	21,325,240	52.72	40,448,336
1892...	12,626,784	30.14	6,451,076	15.40	22,815,480	54.46	41,893,340
1893...	12,357,444	28.68	6,892,352	15.99	23,839,741	55.33	43,089,537
1894...	12,035,005	29.08	6,705,434	16.20	22,650,761	4.72	41,391,200
1895...	14,269,932	30.68	7,298,124	15.69	24,943,421	56.63	46,511,477
1896...	13,097,571	30.34	6,490,441	15.03	23,589,473	54.63	43,177,485
1897...	12,181,061	29.26	6,249,540	15.00	23,207,263	55.74	41,637,864
1898...	12,078,875	28.83	6,253,109	14.92	23,567,767	56.25	41,899,751
1899...	14,199,009	29.79	6,887,909	14.45	26,578,286	55.76	47,665,204
Total..	379,950,635	33.71	194,438,217	17.26	552,516,312	49.03	1,126,905,164

α Includes Loyalsock field.

In the heading of the above table it is noted that shipments indicated the coal loaded on cars for market; in the table given below is shown approximately the destination of these shipments for consumption in the several States of the Union.

Approximate distribution of anthracite coal shipments in 1899.

State.	Tons of 2,240 pounds.	State.	Tons of 2,240 pounds.
Alabama	1,500	Nebraska	149,850
Arkansas	500	New Hampshire	370,810
California	9,368	New Jersey	4,693,500
Connecticut	1,185,882	New York	12,503,896
Delaware	249,405	North and South Dakota	2,000
Georgia	36,662	Ohio	672,370
Illinois	2,188,294	Oklahoma	893
Indiana	198,998	Oregon	4,000
Iowa	237,456	Pennsylvania	13,803,253
Kansas	20,842	Rhode Island	553,495
Kentucky	19,425	South Carolina	41,288
Louisiana	16,000	Tennessee	6,760
Maine	633,490	Texas	12,949
Maryland and Dis- trict of Columbia ..	1,252,832	Vermont	405,095
Massachusetts	3,994,859	Virginia	303,700
Michigan	592,094	Washington	2,500
Minnesota	518,163	West Virginia	366
Mississippi	535	Wisconsin	942,599
Missouri	318,316	Exports	1,707,796
Montana	200		
North Carolina	11,262	Total	47,665,203

It is not intended that the above figures should be considered as absolutely accurate, as from the nature of the case it is impossible to secure complete returns, but it is believed that they represent very fairly the movements of anthracite to the various sections of the country. It is interesting to note the comparatively small section in which the bulk of the anthracite production is consumed. For instance, the three States of New York, Pennsylvania, and New Jersey take nearly 65 per cent, while the New England States use nearly 15 per cent, and Delaware, Maryland, and Virginia about 3 $\frac{1}{2}$ per cent, making the consumption of the States along the upper Atlantic seaboard over 83 $\frac{1}{2}$ per cent. It will also be noticed that the territory east of the Mississippi River uses more than 93 per cent of the total shipments, and of the remain-

ing $6\frac{1}{2}$ per cent $3\frac{1}{4}$ is exported, thus leaving less than 3 per cent for consumption in the territory west of the Mississippi River.

At first glance this seems to be a very uneven distribution of the product, but a little consideration will show it to be what would naturally be expected, for anthracite could hardly compete successfully in the West with cheap bituminous coal when to the high first cost of anthracite is added the large freight charges.

It is, therefore, in those sections within easy reach of the mines by rail or conveniently situated for water transportation that any considerable increase in the use of anthracite is to be looked for.

As has been customary in previous reports, a tabular arrangement of the various sections of the anthracite fields is given below, and a list of railroads entering the territory:

<i>Geological field or basin.</i>	<i>Local district.</i>	<i>Trade region.</i>
Northern	Carbondale	Wyoming.
	Scranton	
	Pittston	
	Wilkesbarre	
	Plymouth	
Eastern middle ..	Kingston	Lehigh.
	Green Mountain	
	Black Creek	
	Hazleton	
Southern	Beaver Meadow	Schuylkill.
	Panther Creek	
	East Schuylkill	
	West Schuylkill	
Western middle..	Lorberry	Schuylkill.
	Lykens Valley	
	East Mahanoy	
	West Mahanoy	
	Shamokin	

The above-named fields comprise an area of something over 480 square miles, and are located in the eastern middle part of the State, in the counties of Carbon, Columbia, Dauphin, Lackawanna, Luzerne, Northumberland, Schuylkill, and Susquehanna, and are classed under three general divisions, viz, Wyoming, Lehigh, and Schuylkill regions. Geologically they are divided into fields or basins, which are again subdivided into districts.

The Bernice field, in Sullivan County, is not included in any of these regions. The classification of the product of this field is a matter of some contention. The fracture of the coal and some of its physical characteristics are more like some bituminous or semianthracite coals than strict anthracite, but on account of its high percentage of fixed

carbon and low percentage of moisture it is classed as anthracite by the Second Pennsylvania Geological Survey, and the product is so included in this report.

The above territory is reached by eleven so-called initial railroads, as follows:

Philadelphia and Reading Railway Company.
Lehigh Valley Railroad Company.
Central Railroad Company of New Jersey.
Delaware, Lackawanna and Western Railroad Company.
Delaware and Hudson Company's Railroad.
Pennsylvania Railroad Company.
Erie and Wyoming Valley Railroad Company.
Erie Railroad Company.
New York, Ontario and Western Railway Company.
Delaware, Susquehanna and Schuylkill Railroad Company.
New York, Susquehanna and Western Railroad Company.

PENNSYLVANIA BITUMINOUS COAL.

Total product in 1899, 74,150,175 short tons; spot value, \$56,247,791.

The production of bituminous coal in Pennsylvania in 1899 shows a gain over the output in 1898 of 8,985,042 short tons, or 13.8 per cent. This increase in tonnage was not as large as that of 1898 over 1897 or of 1895 over 1894, in both of which years the gain was over 10,000,000 tons, but in each of those years the increased product was accompanied by a decline in price, while in 1899 the value per ton was advanced from 67 cents to 76 cents and the increase in the total value of the bituminous product in 1899 was more than the combined increase in value for the other two years mentioned. The increase in value of the Pennsylvania bituminous product in 1899 was larger than the value of the entire output of any other State with the exception of Illinois and Ohio. The average price per ton (76 cents) was the highest obtained since 1893.

Of the total bituminous product in 1899, over 22,000,000 tons, or about 30 per cent, was mined by machines. Machine mining has shown rapid development in the bituminous fields of Pennsylvania. In 1891 only 72 machines were reported in use in the State. The number had increased to 454 in 1896, to 690 in 1897, to 1,085 in 1898, and to 1,343 in 1899. The machine-won tonnage for the same years was: 1891, 431,440; 1896, 6,092,644; 1897, 8,925,293; 1898, 16,512,480, and 1899, 22,000,722. Machines driven by compressed air appear to be the favorite type in Pennsylvania mines. Of the 1,343 machines in use in 1899, 944 were air pick or punching machines, 50 were air-driven chains, and 349 were electric chain machines. No long-wall machines were used.

PRODUCTION BY COUNTIES.

It was observed in the report for 1898 that the effect of the increased activity in the iron and steel trade was reflected in the bituminous coal production of Pennsylvania, and particularly upon that of the four leading counties—Fayette, Westmoreland, Allegheny, and Cambria. What was said for 1898 holds good for 1899. The first two counties embrace what is known as the Connellsville coking region, and the greater portion of the product is made into coke for blast furnace and foundry use. Allegheny County, in which Pittsburg is situated, is the center of the great iron-making district of Pennsylvania, and Cambria County contains Johnstown and its iron and steel industries. These four counties produce from 60 to 63 per cent of the State's total output of bituminous coal (62 per cent in 1899), and 69 per cent of the total increase in the bituminous product for 1899 was contributed by them. The combined product of the four counties in 1899 was practically 46,000,000 short tons, nearly double the entire output of Illinois. The largest increase in 1899 was in Westmoreland County, which added 2,766,280 tons, or 24 per cent, to its output for 1898. Fayette County gained 1,913,226 tons, or 15 per cent. The third in increased production and first in percentage of gain among the important producers was Somerset County with an increment of 1,103,945 short tons, or 60 per cent. The product of Somerset County has trebled in two years. Allegheny County gained 1,082,063 tons, or 12 per cent, and Cambria County gained 468,373 tons, or 7 per cent. There were only three counties which did not share in the general improvement. These were Lawrence, McKean, and Tioga. In the two first named the decreases were insignificant, Tioga bearing 98½ per cent of the total decrease.

The statistics of production by counties in 1898 and 1899, with the distribution of the product for consumption, are presented in the following tables:

Bituminous coal product of Pennsylvania in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Allegheny	88	8,299,087	492,522	97,863	525	8,889,997	\$6,279,507	\$0.71	209	13,556
Armstrong	14	778,614	34,731	5,059		818,404	558,924	.68	204	1,497
Beaver	10	212,932	7,267	3,656		223,855	205,659	.90	213	446
Bedford	14	328,534	4,460	4,829	118,684	456,507	301,025	.66	192	890
Blair	4	331,700	6,102	5,398	60,843	404,043	282,830	.70	254	675
Butler	9	159,226	993	1,093		161,312	109,737	.68	151	511
Cambria	89	6,113,831	57,916	61,890	506,824	6,740,461	4,437,670	.66	246	8,814
Center	16	705,398	7,856	921		714,175	429,698	.60	201	1,072
Clarion	15	276,291	663	1,177		278,131	167,488	.60	217	540
Clearfield	126	5,662,335	59,089	48,217	286,098	6,055,739	3,746,504	.62	228	8,482
Elk	7	853,080	13,575	6,830		873,485	636,413	.73	292	1,314
Fayette	71	4,312,322	50,532	198,620	8,134,589	12,696,063	7,778,959	.61	248	10,290
Huntingdon	9	302,999	3,653	5,955		312,607	206,000	.66	224	493
Indiana	13	535,939	3,284	1,000	23,568	563,791	378,784	.67	218	597
Jefferson	21	4,672,984	15,360	26,252	910,572	5,625,168	3,404,553	.61	266	6,045
Lawrence	6	180,951	855	3,602		185,408	164,254	.89	202	504
Mercer	10	297,262	5,868	13,539		316,669	222,926	.70	135	897
Somerset	31	1,799,795	10,926	13,271	22,406	1,846,398	1,134,821	.61	247	2,059
Tioga	11	904,440	9,486	6,842	992	921,760	1,068,836	1.16	200	1,994
Washington	43	4,675,020	29,140	49,513		4,753,673	2,768,771	.58	189	6,236
Westmoreland	78	6,310,153	101,345	176,754	4,826,737	11,414,989	8,147,435	.71	241	12,181
Bradford	2	188,160	395	203		188,758	179,431	.95	190	276
Clinton										
Lycoming	2	118,508	4,732	500		123,740	142,363	1.15	229	242
McKean										
Small mines			600,000			600,000	600,000			
Total	689	48,019,561	1,520,750	732,984	14,891,838	65,165,133	43,352,588	.67	229	79,611

Bituminous coal product of Pennsylvania in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
Allegheny ..	92	9,605,292	299,894	64,469	2,406	9,972,060	\$7,390,534	\$0.74	224	12,751
Armstrong ..	14	1,038,808	9,327	6,254		1,064,389	767,634	.73	268	1,364
Beaver	9	248,722	8,557	1,187		258,466	255,486	.99	271	438
Bedford	12	405,926	3,549	4,066	80,424	493,965	371,113	.75	238	777
Blair	4	327,881	2,879	4,309	72,787	407,356	325,883	.80	237	639
Butler	12	204,896	9,100	903		214,899	154,890	.72	205	356
Cambria	66	6,613,633	120,877	63,796	410,508	7,208,834	5,571,157	.77	261	9,188
Center	15	908,113	2,981	1,554		912,648	675,031	.74	218	1,170
Clarion	14	285,610	1,663	2,480		289,753	196,758	.68	239	536
Clearfield	114	5,808,125	27,297	81,589	334,431	6,251,442	4,319,916	.69	239	7,961
Elk	10	1,198,411	12,454	11,114		1,221,979	697,356	.57	261	1,837
Fayette	75	4,886,253	134,100	211,137	9,377,799	14,609,289	10,709,429	.73	279	11,517
Huntingdon ..	9	338,985	3,336	7,117	8,374	357,812	280,365	.78	256	528
Indiana	19	557,870	5,383	1,906	51,750	616,911	436,687	.71	210	712
Jefferson	26	4,698,941	15,539	125,508	1,001,972	5,841,960	3,553,306	.61	228	6,018
Lawrence	5	178,663	4,374	518		183,555	163,364	.89	263	332
Mercer	11	463,347	4,897	14,440	4,000	486,724	394,644	.81	217	787
Somerset	39	2,864,116	20,866	31,353	34,009	2,960,343	2,079,466	.70	261	3,575
Tioga	12	650,562	15,293	4,271		670,126	773,208	1.15	164	2,070
Washington ..	40	4,909,634	41,146	36,560		4,987,360	3,668,194	.74	222	5,648
Westmoreland ..	84	7,105,563	177,474	296,943	6,601,289	14,181,269	12,485,659	.88	258	13,939
Bradford	3	252,509	384	516		253,409	229,663	.91	274	362
Clinton										
Lycoming	2	120,023	4,903	700		125,626	148,049	1.18	241	307
McKean										
Small mines ..			600,000			600,000	600,000			
Total ..		687,53,671,963	1,525,772	972,692	17,979,748	74,150,175	56,247,791	.76	245	82,812

In the following table are exhibited the total production by counties during the past four years, and the increases and decreases in 1899 as compared with 1898:

Bituminous coal product of Pennsylvania since 1896, by counties.

[Short tons.]

County.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.	Per cent of in- crease.	Per cent of de- crease.
Allegheny.....	7,856,867	7,216,039	8,889,997	9,972,060	1,082,063	.....	12.2	.....
Armstrong.....	614,932	857,637	818,404	1,054,389	235,985	.....	28.8	.....
Beaver.....	127,290	99,546	223,855	258,466	34,611	.....	15.5	.....
Bedford.....	237,414	436,619	456,507	493,965	37,458	.....	8.2	.....
Blair.....	360,987	492,976	404,043	407,356	3,313	.....	.8	.....
Bradford.....	53,519	41,588	22,508	31,835	9,327	.....	41.4	.....
Butler.....	230,336	233,689	161,312	214,899	53,587	.....	33.2	.....
Cambria.....	4,649,819	5,416,950	6,740,461	7,208,834	468,373	.....	6.9	.....
Center.....	251,665	521,100	714,175	912,648	198,473	.....	27.8	.....
Clarion.....	371,749	247,839	278,131	289,753	11,622	.....	4.2	.....
Clearfield.....	4,812,017	5,479,047	6,055,739	6,251,442	195,703	.....	3.2	.....
Clinton.....	134,569	157,333	166,250	221,574	55,324	.....	33.4	.....
Elk.....	807,886	969,503	873,485	1,221,979	348,494	.....	39.9	.....
Fayette.....	8,076,200	9,701,691	12,696,063	14,609,289	1,913,226	.....	15.1	.....
Huntingdon.....	339,597	303,939	312,607	357,812	45,205	.....	14.5	.....
Indiana.....	418,642	541,967	563,791	616,911	53,120	.....	9.4	.....
Jefferson.....	4,508,077	4,697,059	5,625,168	5,841,960	216,792	.....	3.9	.....
Lawrence.....	198,666	195,286	185,408	183,555	.....	1,853	.....	1.0
Lycoming.....	83,230	91,735	98,118	101,923	3,805	.....	3.9	.....
McKean.....	33,133	31,527	25,622	23,703	.....	1,919	.....	7.5
Mercer.....	579,069	435,772	316,669	486,724	170,055	.....	53.7	.....
Somerset.....	787,050	924,607	1,846,398	2,950,343	1,103,945	.....	59.8	.....
Tioga.....	825,687	938,053	921,760	670,126	.....	251,634	.....	27.3
Washington.....	4,039,976	3,862,661	4,753,673	4,987,360	233,687	.....	4.9	.....
Westmoreland...	8,559,076	9,923,812	11,414,989	14,181,269	2,766,280	.....	24.2	.....
Small mines.....	600,000	600,000	600,000	600,000	.....	.....	.....	.....
Total.....	49,557,453	54,417,974	65,165,133	74,150,175	9,240,448	255,406	.....	.....
Net increase.....	a 659,775	4,860,521	10,746,859	8,985,042	8,985,042	.....	13.8	.....

a Net decrease.

The distribution of the product for the past eleven years has been as follows:

Distribution of the bituminous coal product of Pennsylvania from 1889 to 1899.

Years.	Num- ber of mines.	Loaded at mines for ship- ment.	Sold to local trade and used by em- ployees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Aver- age price per ton.	Aver- age num- ber of days active.	Average number of em- ployees.
		Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
1889	24,069,913	1,590,651	332,937	10,190,568	36,174,089	\$27,963,315	\$0.77	.....	53,780
1890	29,288,923	1,473,317	395,837	11,144,096	42,302,173	36,376,916	.84	232	61,333
1891	29,976,914	2,007,348	321,225	10,483,003	42,788,490	37,271,063	.87	223	63,661
1892	32,425,949	2,207,827	356,779	11,704,021	46,694,576	39,017,164	.84	223	66,655
1893	33,322,328	1,934,429	426,122	8,387,845	44,070,724	35,260,674	.80	190	71,981
1894	613 29,722,808	1,569,596	342,294	8,257,771	39,912,463	29,479,820	.74	165	75,010
1895	568 35,164,453	1,732,808	468,381	12,851,591	50,217,228	35,980,357	.72	206	71,130
1896	569 37,696,555	1,570,161	504,224	9,786,513	49,557,453	35,368,249	.71	206	72,625
1897	575 40,419,846	1,653,049	556,604	11,968,392	54,597,891	37,636,347	.69	206	77,599
1898	689 48,019,561	1,520,750	732,984	14,891,838	65,165,133	43,352,588	.67	229	79,611
1899	687 53,671,963	1,525,772	972,692	17,979,748	74,150,175	56,247,791	.76	245	82,812

The following table exhibits the total production since 1873:

Product of bituminous coal in Pennsylvania since 1873.

Year.	Short tons.	Year.	Short tons.
1873	13,098,829	1887	31,516,856
1874	12,320,000	1888	33,796,727
1875	11,760,000	1889	36,174,089
1876	12,880,000	1890	42,302,173
1877	14,000,000	1891	42,788,490
1878	15,120,000	1892	46,694,576
1879	16,240,000	1893	44,070,724
1880	21,280,000	1894	39,912,463
1881	22,400,000	1895	50,217,228
1882	24,640,000	1896	49,557,453
1883	26,880,000	1897	54,417,974
1884	28,000,000	1898	65,165,133
1885	26,000,000	1899	74,150,175
1886	27,094,501		

TENNESSEE.

Total product in 1899, 3,330,659 short tons; spot value, \$2,940,644.

Tennessee's coal production has exhibited an uninterrupted increase since 1893, the output in 1899 being 307,763 short tons, or a little more than 10 per cent larger than that of 1898, which in turn was 134,047 short tons, or not quite 5 per cent greater than the 1897 product. The value of the product in 1899 was \$603,132, or nearly 26 per cent larger than that of the 1898 output which, notwithstanding its gain in tonnage over 1897, was worth but \$7,000 more than the product of the former year. Sympathizing with the general business revival in 1899 the average price per ton for Tennessee coal advanced from 77 to 88 cents, the highest figure recorded since 1895. From \$1.13 in 1892 the price declined each year until in 1898 it was as low as 77 cents, a total decline in six years of 36 cents, or nearly one-third.

Machine mining showed a substantial increase in 1899, so far as tonnage is concerned. The product won by machines last year amounted to 201,333 short tons against 152,002 tons in 1898 and 47,207 tons in 1897.

The statistics of production in the past two years are exhibited in the following tables:

Coal product of Tennessee in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Anderson	8	571,740	1,206	5,120	800	578,866	\$446,636	\$0.77	253	1,141
Campbell	13	313,306	3,793	3,653	5,000	325,757	292,804	.90	166	1,292
Claiborne	4	254,674	3,000	1,700	39,200	298,574	224,815	.75	228	411
Hamilton	2	122,482	1,700	1,410	74,236	199,828	165,171	.83	268	530
Marion	6	206,887	2,885	1,201	98,692	309,665	266,020	.86	268	616
Morgan	7	249,824	500	1,700	87,268	339,292	164,230	.48	258	745
Rhea	3	16,341	3,406	17,158	147,335	184,239	128,969	.70	250	292
Scott	3	106,711	11,128	3,500	23,877	145,216	122,268	.84	194	314
Cumberland ..	3	158,398	773	4,364	99,821	263,356	186,640	.71	230	634
Grundy										
Putnam										
Roane	2	198,712	5,081	12,712	157,098	373,603	335,419	.90	273	668
White										
Small mines ..			4,500			4,500	4,500	1.00		
Total	51	2,199,075	37,971	52,523	733,327	3,022,896	2,337,512	.77	234	6,648

Coal product of Tennessee in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Anderson	8	590,515	32,037	5,662	.....	637,214	\$569,770	\$0.89	266	1,417
Campbell	12	418,919	6,111	4,687	.....	429,717	438,748	1.02	210	1,235
Claiborne	5	331,047	9,862	3,100	43,490	387,499	319,399	.82	223	615
Cumberland	2	1,000	80	.....	.....	1,080	1,200	1.11	11	61
Hamilton	2	129,172	1,676	1,360	67,022	199,230	196,135	.98	230	320
Marion	6	228,682	5,562	1,467	103,655	339,366	297,525	.88	264	672
Morgan	7	254,364	574	.....	96,398	350,336	250,501	.72	271	672
Rhea	3	15,692	2,495	17,318	145,923	181,428	142,127	.78	257	348
Scott	3	113,389	16,886	6,718	20,263	157,256	151,076	.96	191	370
Grundy, Putnam, Roane, White	4	352,875	6,568	15,363	268,227	643,033	569,663	.89	309	1,239
Small mines			4,500	.....	.....	4,500	4,500	.....	.....	.....
Total	52	2,444,655	86,351	55,675	743,978	3,330,659	2,940,644	.88	252	6,949

The distribution of the product for consumption in the past eleven years was as follows:

Distribution of the coal product of Tennessee from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889		1,334,424	29,101	23,034	539,130	1,925,689	\$2,238,309	\$1.21	.....	4,108
1890		1,482,357	41,932	23,583	621,713	2,169,585	2,395,746	1.10	263	5,082
1891		1,626,964	100,478	33,302	652,934	2,413,678	2,668,188	1.105	230	5,097
1892		1,448,262	55,452	17,037	571,313	2,092,064	2,355,441	1.13	240	4,926
1893		1,427,219	42,560	20,921	411,558	1,902,258	2,048,449	1.08	232	4,976
1894	43	1,571,406	59,985	28,963	520,495	2,180,879	2,119,481	.97	210	5,542
1895	44	1,808,056	51,923	25,477	650,188	2,535,644	2,349,032	.93	224	5,120
1896	45	1,990,538	43,752	40,343	588,473	2,663,106	2,281,295	.86	211	6,531
1897	45	2,150,179	37,620	39,275	661,775	2,888,849	2,329,534	.81	221	6,337
1898	51	2,199,075	37,971	52,523	733,327	3,022,896	2,337,512	.77	234	6,643
1899	52	2,444,655	86,351	55,675	743,978	3,330,659	2,940,644	.88	252	6,949

MINERAL RESOURCES.

Below is given the output by counties during the past four years with the increases and decreases in 1899 as compared with 1898:

Coal product of Tennessee since 1896, by counties.

[Short tons.]

County.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
Anderson.....	456,510	557,696	578,866	637,214	58,348	
Campbell.....	384,337	328,494	325,757	429,717	103,960	
Claiborne	203,926	270,927	298,574	387,499	88,925	
Cumberland	120			1,080	1,080	
Grundy	330,648	317,924	251,806	305,736	53,930	
Hamilton.....	163,810	211,959	199,828	199,230		598
Marion.....	294,895	312,241	309,665	339,366	29,701	
Morgan	217,948	301,694	339,292	350,336	11,044	
Putnam	10,900	10,816	11,450	8,586		2,864
Rhea.....	91,615	139,072	184,239	181,428		2,811
Roane.....	169,255	173,383	170,556	162,441		8,115
Scott.....	188,476	88,312	145,216	157,256	12,040	
White.....	146,166	171,831	203,047	166,270		36,777
Other coun- ties and small mines.	4,500	4,500	4,600	4,500		100
Total....	2,663,106	2,888,849	3,022,896	3,330,659	359,028	51,265
Net increase ..	127,462	225,743	134,047	307,763	307,763	

The annual output of the State since 1873 has been as follows:

Coal product of Tennessee from 1873 to 1899.

Year.	Short tons.	Year.	Short tons.
1873.....	350,000	1887.....	1,900,000
1874.....	350,000	1888.....	1,967,297
1875.....	360,000	1889.....	1,925,689
1876.....	550,000	1890.....	2,169,585
1877.....	450,000	1891.....	2,413,678
1878.....	375,000	1892.....	2,092,064
1879.....	450,000	1893.....	1,902,258
1880.....	641,042	1894.....	2,180,879
1881.....	750,000	1895.....	2,535,644
1882.....	850,000	1896.....	2,663,106
1883.....	1,000,000	1897.....	2,888,849
1884.....	1,200,000	1898.....	3,022,896
1885.....	1,440,957	1899.....	3,330,659
1886.....	1,714,290		

TEXAS.

Total product in 1899, 883,832 short tons; spot value, \$1,334,895.

The year 1899 was the eighth successive year in which the coal product of Texas has shown an increase over the preceding one. Compared with 1898 the product increased 197,098 short tons, or 29 per cent, while since 1891 it has increased over five times. The increase in 1898 was altogether in bituminous coal, the lignite product differing from that made in 1898 by only 2 tons. Part of the increased production in 1899 was due to the product reported from Maverick County, no returns having been made from that county from 1893 to 1898. The statistics of production in 1898 and 1899 have been as follows:

Coal product of Texas in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
Bituminous:		Short tons.	Short tons.	Short tons.	Short tons.				
Coleman	7	487,602	915	1,798	490,315	\$968,871	\$1.96	249	1,786
Erath									
Palo Pinto									
Parker									
Webb									
Wise									
Lignite:									
Bastrop	9	191,130	2,332	2,957	196,419	170,892	.87	224	344
Medina									
Milam									
Nacogdoches									
Robertson									
Total	16	678,732	3,247	4,755	686,734	1,139,763	1.66	245	2,130

Coal product of Texas in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
Bituminous:		Short tons.	Short tons.	Short tons.	Short tons.				
Coleman	9	681,285	350	5,776	687,411	\$1,184,177	\$1.73	260	2,067
Erath									
Maverick									
Palo Pinto									
Parker									
Webb									
Wise									
Lignite:									
Bastrop	9	157,881	34,340	4,200	196,421	146,718	.75	229	323
Medina									
Milam									
Robertson									
Wood									
Total	18	839,166	34,690	9,976	883,832	1,334,895	1.51	256	2,410

In the following table is shown the record of production since 1889:

Coal product of Texas since 1889.

Distribution.	1889.	1890.	1891.	1892.	1893.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Loaded at mines for shipment ..	120,602	180,800	169,300	241,005	300,064
Sold to local trade and used by employees	6,552	1,840	900	4,460	462
Used at mines for steam and heat	1,062	1,800	1,900	225	1,680
Total	128,216	184,440	172,100	245,690	302,206
Total value	\$340,617	\$465,900	\$412,300	\$569,333	\$688,407

Distribution.	1894.	1895.	1896.	1897.	1898.	1899.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Loaded at mines for shipment ..	417,281	475,157	522,177	621,635	678,732	859,166
Sold to local trade and used by employees	2,412	7,705	12,846	8,357	3,247	34,690
Used at mines for steam and heat	1,155	2,097	8,992	9,349	4,755	9,976
Total	420,848	484,959	544,015	639,341	686,734	883,832
Total value	\$976,456	\$913,138	\$896,251	\$972,323	\$1,139,763	\$1,334,895

UTAH.

Total product in 1899, 786,049 short tons; spot value, \$997,271.

Utah shared in the widespread business revival in 1899, as evinced by an increase of 32 per cent in her coal output over the product of 1898. The value increased proportionately, Utah being one of the half dozen States in which there was no advance in price, but as the average price per ton in 1898 was 8 cents higher than in 1897 and remained stationary in 1899, conditions were decidedly favorable.

Carbon County is the only important coal-producing county in the State, nearly 95 per cent of the output both in 1898 and 1899 being from this one county.

Production by counties in the past two years was as follows:

Coal product of Utah in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Carbon	6	460,082	4,138	6,600	86,606	557,426	\$697,683	\$1.25	262	611
Iron	4	.....	605	10	.....	615	1,507	2.45	38	12
Sanpete	2	2,500	2,240	.....	.....	4,740	7,750	1.64	87	28
Summit	6	20,984	4,459	3,135	.....	28,528	41,712	1.46	180	79
Emery	2	2,200	100	100	.....	2,400	3,600	1.50	222	9
Uinta										
Total	20	485,716	11,542	9,845	86,606	593,709	752,252	1.27	243	739

Coal product of Utah in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Carbon.....	7	719,544	4,972	10,000	5,819	740,335	\$926,523	\$1.25	283	610
Iron.....	3		629			629	1,442	2.29	55	7
Summit.....	4	81,262	1,554	3,046		35,862	50,748	1.41	209	78
Uinta.....	9		5,478			5,478	12,214	2.23	156	35
Emery.....	2	3,075	670			3,745	6,744	1.69	216	13
Sanpete.....										
Total.....	25	753,881	13,303	13,046	5,819	786,049	997,271	1.27	265	743

The distribution of the product since 1891 and the total output since 1885 are shown in the following tables:

Distribution of the coal product of Utah since 1891.

Year.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1891.....	315,711	8,233	21,650	25,451	371,045	\$668,646	\$1.80		621
1892.....	321,431	6,775	6,509	26,298	361,013	562,625	1.56	230	646
1893.....	350,423	7,649	4,258	50,875	413,205	611,092	1.48	226	576
1894.....	364,675	11,173	6,892	48,810	431,550	608,479	1.40	199	671
1895.....	376,479	25,097	7,253	68,027	471,836	617,349	1.31	208	670
1896.....	340,338	9,171	7,411	61,707	418,627	500,547	1.20	202	679
1897.....	424,770	22,667	9,198	64,925	521,560	618,230	1.19	204	704
1898.....	485,716	11,542	9,845	86,606	593,709	752,252	1.27	243	739
1899.....	753,881	13,303	13,046	5,819	786,049	997,271	1.27	265	743

Coal product of Utah since 1885.

Year.	Short tons.	Year.	Short tons.
1885.....	213,120	1893.....	413,205
1886.....	200,000	1894.....	431,550
1887.....	180,021	1895.....	471,836
1888.....	258,961	1896.....	418,627
1889.....	236,651	1897.....	521,560
1890.....	318,159	1898.....	593,709
1891.....	371,045	1899.....	786,049
1892.....	361,013		

VIRGINIA.

Total product in 1899, 2,105,791 short tons; spot value, \$1,304,241.

With an increased product of nearly 300,000 tons over the tonnage of 1898, Virginia reached a total output of over 2,000,000 short tons for the first time in her history. Tazewell and Wise counties, which together contribute about 98 per cent of the product, made up the entire increase for 1899, a slight falling off in tonnage being reported in the other counties. The developments in Wise County have been particularly noticeable, the product in this county reaching a total of 1,232,613 tons in 1899, as against 992,723 tons in 1898 and 712,011 tons in 1897.

Coal product of Virginia in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Chesterfield, Henrico, Montgomery, and Pulaski	10	32,946	7,390	200	.....	40,536	\$54,999	\$1.36	189	119
Tazewell	2	528,024	7,726	8,792	237,473	782,015	453,000	.58	210	762
Wise	8	468,215	4,448	7,242	512,818	992,723	562,418	.57	250	984
Total..	20	1,029,185	19,564	16,234	750,291	1,815,274	1,070,417	.59	230	1,855

Coal product of Virginia in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Montgomery ..	10	7,230	12,785	523	.....	20,538	\$40,781	\$1.99	152	70
Tazewell	2	603,916	4,127	10,920	225,064	844,027	461,288	.54	219	730
Wise	11	567,202	5,265	7,561	662,585	1,232,613	793,174	.64	284	1,113
Henrico	2	7,156	1,457	.....	.....	8,613	8,998	1.04	110	47
Pulaski										
Total...	25	1,175,504	23,634	19,004	887,649	2,105,791	1,304,241	.62	252	1,960

Distribution of the coal product of Virginia from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
1889.....		732,881	13,179	7,516	112,210	865,786	\$804,475	\$0.93		1,555
1890.....		608,641	17,002	4,908	153,460	784,011	589,925	.75	296	1,295
1891.....		583,082	16,685	3,178	133,454	736,399	611,654	.83	246	820
1892.....		527,304	20,721	6,611	120,569	675,205	578,429	.86	192	836
1893.....		714,188	20,578	4,609	80,964	820,339	692,748	.84	253	961
1894.....	28	1,015,713	21,162	4,690	187,518	1,229,083	933,576	.76	234	1,635
1895.....	22	1,024,200	15,173	22,338	306,613	1,368,324	869,873	.63	225	2,158
1896.....	29	824,042	40,951	38,540	351,190	1,254,723	848,851	.68	198	2,510
1897.....	21	969,973	29,017	43,087	486,225	1,528,302	1,021,918	.67	213	2,344
1898.....	20	1,029,185	19,564	16,234	750,291	1,815,274	1,070,417	.59	230	1,855
1899.....	25	1,175,504	23,634	19,004	887,649	2,105,791	1,304,241	.62	252	1,960

Coal product of Virginia since 1880.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1880.....	112,000				
1881.....	112,000				
1882.....	112,000				
1883.....	252,000				
1884.....	336,000				
1885.....	567,000				
1886.....	684,951				
1887.....	825,263				
1888.....	1,073,000				
1889.....	865,786	\$804,475	\$0.93		1,555
1890.....	784,011	589,925	.75	296	1,295
1891.....	736,399	611,654	.83	246	820
1892.....	675,205	578,429	.86	192	836
1893.....	820,339	692,748	.84	253	961
1894.....	1,229,083	933,576	.76	234	1,635
1895.....	1,368,324	869,873	.63	225	2,158
1896.....	1,254,723	848,851	.68	198	2,510
1897.....	1,528,302	1,021,918	.67	213	2,344
1898.....	1,815,274	1,070,417	.59	230	1,855
1899.....	2,105,791	1,304,241	.62	252	1,960

WASHINGTON.

Total product in 1899, 2,029,881 short tons; spot value, \$3,603,989.

Washington is the only one of the Pacific coast States whose coal product amounts to as much as 1 per cent of the total bituminous output. It is also the only State on the Pacific coast producing true bituminous coal, the entire product of California and Oregon being lignite or brown coals. Some of the Washington coals are true coking coals, over 50,000 tons in 1899 being made into coke. Some of the coals produced in Washington approach anthracite in character, and some "natural coke" has been observed. Production in the State has exceeded 1,000,000 tons annually since 1888, and has increased steadily each year since 1894. It exceeded 2,000,000 tons in 1899 for the first time. The three principal producing counties are King, Kittitas, and Pierce, the combined tonnage from all the other four counties being less than 1 per cent of the total output of the State.

The statistics of production are shown in the following tables:

Coal product of Washington in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
King	11	725,811	22,742	37,253	.....	785,806	\$1,626,318	\$2.07	268	1,542
Kittitas	3	555,742	3,699	6,955	.....	566,396	702,948	1.24	259	735
Pierce	4	458,351	1,941	11,364	37,486	509,142	965,197	1.90	283	796
Cowlitz	3	228	1,620	.....	.....	1,848	4,070	2.20	135	13
Lewis										
Skagit	2	8,279	634	1,394	11,072	21,379	54,265	2.54	309	60
Whatcom										
Total	23	1,748,411	30,636	56,966	48,558	1,884,571	3,352,798	1.78	270	3,145

Coal product of Washington in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
King	13	795,512	10,982	40,809	.....	847,303	\$1,786,033	\$2.11	238	1,434
Kittitas	4	648,820	5,934	6,456	.....	661,210	811,597	1.23	272	912
Pierce	5	446,429	2,915	12,360	44,681	506,385	969,564	1.91	278	919
Cowlitz	2	150	450	180	.....	780	1,620	2.06	62	8
Lewis										
Skagit	2	7,051	.....	1,638	5,514	14,203	35,175	2.48	289	57
Whatcom										
Total	26	1,897,962	20,281	61,443	50,195	2,029,881	3,603,989	1.78	259	3,330

Distribution of the coal product of Washington from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889		956,046	15,574	19,958	39,000	1,030,578	\$2,398,238	\$2.32	.....	2,657
1890		1,212,621	17,249	17,019	16,800	1,263,689	3,426,590	2.71	270	2,206
1891		1,008,496	12,025	20,428	15,300	1,066,249	2,437,270	2.31	211	2,447
1892		1,150,865	9,802	40,085	12,675	1,213,427	2,763,547	2.28	247	2,564
1893		1,186,109	18,888	48,506	11,374	1,264,877	2,920,876	2.31	241	2,757
1894	19	1,030,232	10,822	56,853	8,563	1,106,470	2,578,441	2.33	207	2,662
1895	22	1,108,868	16,320	43,249	22,973	1,191,410	2,577,958	2.16	224	2,840
1896	21	1,095,484	16,722	44,613	38,685	1,195,504	2,396,078	2.00	221	2,622
1897	23	1,347,915	7,149	39,902	39,146	1,434,112	2,777,687	1.94	236	2,789
1898	23	1,748,411	30,636	56,966	48,558	1,884,571	3,352,798	1.78	270	3,145
1899	26	1,897,962	20,281	61,443	50,195	2,029,881	3,603,989	1.78	259	3,330

Product of coal in Washington since 1895, by counties.

[Short tons.]

County.	1895.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
Cowlitz		1,263	1,248	1,088	480	.....	608
King	435,971	481,710	583,488	785,806	847,303	61,497	.....
Kittitas	281,534	265,958	370,657	566,396	661,210	94,814	.....
Lewis				760	300	.....	460
Pierce	437,029	419,568	458,394	509,142	506,385	.....	2,757
Skagit	20,326	18,548	13,825	12,226	6,755	.....	5,471
Whatcom	a 16,550	8,462	a 6,500	9,153	7,448	.....	1,705
Total	1,191,410	1,195,504	1,434,112	1,884,571	2,029,881	b 145,310	.....

a Including Thurston County.

b Net Increase.

Product of coal in Washington since 1885.

Year.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	<i>Short tons.</i>				
1885.....	380,250				
1886.....	423,525	\$952,931	\$2.25		
1887.....	772,601	1,699,746	2.19		1,571
1888.....	1,215,750	3,647,250	3.00		
1889.....	1,030,578	2,393,238	2.32		2,657
1890.....	1,263,689	3,426,590	2.71	270	2,006
1891.....	1,056,249	2,437,270	2.31	211	2,447
1892.....	1,213,427	2,763,547	2.28	247	2,564
1893.....	1,264,877	2,920,876	2.31	241	2,757
1894.....	1,106,470	2,578,441	2.33	207	2,662
1895.....	1,191,410	2,577,958	2.16	224	2,840
1896.....	1,195,504	2,396,078	2.00	221	2,622
1897.....	1,434,112	2,777,687	1.94	236	2,739
1898.....	1,884,571	3,352,798	1.78	270	3,145
1899.....	2,029,881	3,603,989	1.78	259	3,330

WEST VIRGINIA.

Total product in 1899, 19,252,995 short tons; spot value, \$12,053,268.

Compared with 1898, the coal product of West Virginia in 1899 exhibited an increase of 2,551,996 short tons. This was the largest increase in tonnage made by the State in any one year, although the increase in 1898 over 1897 was within 10,000 tons or 0.4 per cent of the 1899 increase. During the last four years West Virginia has held third place among the coal-producing States, having supplanted Ohio in 1896, and by continually augmented production retained the lead then gained. The statistics of production in 1898 indicated that West Virginia would probably equal if not exceed Illinois as a coal producer before the end of the present century, but production in the latter State took a bound in 1899, increased the output by the unprecedented gain of 5,839,720 short tons over 1898, reached a total exceeding 24,400,000 tons, and attained a lead of West Virginia by more than 5,000,000 short tons. Unless unforeseen conditions develop in the present year Illinois will enter the new century as the State second only to Pennsylvania in its production of coal, and West Virginia will follow a close third.

And while West Virginia holds third place in rank in the tonnage of coal, she is still outclassed by Ohio and drops to fourth place when the comparisons are drawn according to the value of the coal produced. The value of Ohio's product exceeded that of West Virginia by \$2,308,635 or 19.15 per cent.

In the steady and almost unbroken series of increase in annual production each year the record of West Virginia stands without a parallel in the history of coal mining in the United States. From 1878 to 1899, a period of twenty-one years, there has been only one instance in which the output during one year was less than that of the preceding one. The one exception was in 1895 when, because of labor troubles in the Pocahontas field (McDowell and Mercer counties), the product from that region was so reduced that it caused a decrease in the total for the State.

A few unimportant strikes occurred in West Virginia during the past year. The total number of mines in which strikes occurred was 34, the number of men made idle was 3,468, and the aggregate time lost was 76,829 working days, less than 1.5 per cent of the time made, and an average loss of 22 days for the strikers.

The use of mining machines showed a substantial increase in 1899. The number of machines reported in 1899 was 154, a gain of 68 machines, or 79 per cent. The machine-mined tonnage increased nearly 43 per cent, from 1,323,929 to 1,881,125 tons, and the percentage of machine-mined product to the total increased from 7.93 to 9.27.

In the following tables are presented the statistics of production in 1898 and 1899:

Coal product of West Virginia in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
Barbour	3	33,076	586	301	1,680	35,643	\$19,566	\$0.55	157	96
Brooke	3	64,875	13,100	80	.....	78,055	59,013	.76	309	132
Fayette	59	3,785,569	46,211	18,682	742,310	4,592,772	2,927,487	.64	198	6,787
Hancock	2	.....	40,912	.....	.....	40,912	40,162	.98	245	78
Harrison	13	384,077	14,065	2,608	10,192	410,942	207,327	.50	232	542
Kanawha	30	1,320,140	12,561	4,191	17,608	1,354,500	924,106	.68	194	2,737
McDowell	32	2,414,745	25,647	11,102	1,453,482	3,904,976	2,110,759	.54	215	3,661
Marion	19	1,847,402	13,563	9,536	243,851	2,114,352	1,128,376	.53	254	2,120
Marshall	3	183,293	9,983	1,956	.....	195,232	127,946	.66	254	245
Mason	6	48,257	67,525	244	.....	116,026	94,443	.81	226	267
Mercer	8	602,001	5,189	2,141	224,838	834,169	466,041	.56	241	901
Mineral	6	580,466	5,637	242	.....	586,345	413,746	.71	253	552
Mingo	10	373,436	3,155	940	.....	377,531	224,685	.60	219	749
Ohio	7	75,885	59,247	1,797	.....	136,929	95,611	.70	243	173
Preston	5	163,104	1,104	2,118	66,277	232,603	130,746	.56	287	275
Putnam	2	203,278	3,129	.....	.....	206,407	132,261	.64	237	472
Taylor	5	242,114	17,920	112	.....	260,146	139,200	.54	204	353
Tucker	7	541,252	4,867	4,008	395,090	945,217	656,575	.70	255	1,278
Grant	3	28,914	784	112	6,500	36,310	19,643	.54	208	77
Monongalia										
Raleigh										
Randolph	2	74,019	1,611	1,006	40,296	116,932	88,572	.76	197	162
Small mines .....	.....	.....	125,000	.....	.....	125,000	125,000	.....	.....	.....
Total ..	225	12,965,903	471,796	61,176	3,202,124	16,700,999	10,181,264	.61	218	21,607

Coal product of West Virginia in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Barbour	3	65,255	1,321	396	12,763	79,735	\$54,031	\$0.68	186	145
Brooke	4	64,982	12,189	75		77,246	56,536	.73	208	141
Fayette	62	4,118,101	54,526	36,071	831,117	5,089,815	3,197,411	.63	231	7,098
Harrison	14	597,854	4,737	3,681	34,750	641,022	347,507	.54	230	1,007
Kanawha	32	1,420,006	40,115	3,859	41,161	1,506,141	1,149,562	.76	198	2,893
McDowell	31	2,763,298	21,337	11,591	1,494,686	4,290,912	2,366,576	.56	245	3,702
Marion	17	2,285,972	16,117	7,530	423,542	2,733,161	1,671,061	.61	286	2,651
Marshall	3	224,127	13,526	1,783		239,436	166,008	.69	283	280
Mason	9	52,540	42,576	2,117		97,233	77,610	.80	206	278
Mercer	8	636,242	5,035	3,020	254,108	898,405	503,874	.56	264	1,016
Mineral	6	623,380	2,987	2,172		628,539	458,346	.73	277	530
Mingo	10	475,326	4,144	1,680		481,150	298,861	.62	276	704
Ohio	7	70,487	68,514	1,220	19,636	159,857	116,262	.73	226	201
Preston	5	244,799	1,248	905	34,462	281,414	202,525	.72	262	359
Putnam	2	207,179	3,042	600		210,821	158,116	.75	215	563
Randolph	2	44,641	2,550	100		47,291	44,684	.94	218	72
Taylor	6	372,485	6,280			378,765	191,730	.51	218	628
Tucker	6	693,814	6,538	9,774	447,844	1,157,470	825,708	.71	302	1,130
Hancock	4	83,784	45,214	448	51,136	180,582	141,865	.79	224	227
Monongalia										
Raleigh										
Small mines			125,000			125,000	125,000			
Total	231	15,044,272	476,996	87,022	3,644,705	19,252,995	12,063,268	.63	242	23,625

The distribution of the total product since 1889 has been as follows:

Distribution of the coal product of West Virginia from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
1889		4,764,900	493,287	37,368	936,325	6,231,880	\$5,086,584	\$0.82		9,952
1890		5,614,752	438,527	30,594	1,310,781	7,394,654	6,208,128	.84	227	12,236
1891		6,887,151	429,878	47,163	1,856,473	9,220,665	7,359,816	.80	237	14,227
1892		7,560,790	441,159	49,563	1,687,243	9,738,756	7,852,114	.80	228	14,867
1893		8,591,962	390,689	46,898	1,679,029	10,708,578	8,251,170	.77	219	16,524
1894	187	9,116,314	428,202	64,126	2,019,115	11,627,757	8,706,808	.75	186	17,824
1895	190	8,858,256	445,023	50,595	2,034,087	11,387,961	7,710,575	.68	195	19,159
1896	189	9,838,053	426,441	56,395	2,555,407	12,876,296	8,336,685	.65	201	19,078
1897	198	11,312,408	446,795	58,694	2,430,262	14,248,159	8,987,393	.68	205	20,504
1898	225	12,965,903	471,796	61,176	3,202,124	16,700,999	10,131,264	.61	218	21,607
1899	231	15,044,272	476,996	87,022	3,644,705	19,252,995	12,063,268	.63	242	23,625

The statement presented in the following table exhibits the county production during the past five years, with the increases and decreases in 1899 as compared with 1898. It will be observed that out of the 23 counties included in the table there were only 4 in which a loss of tonnage was recorded. In 2 of these the loss in each was less than 1,000 tons, and the aggregate of all the decreases did not reach 35,000 tons. Marion County enjoys the distinction of having the largest increase, followed by Fayette, McDowell, Harrison, Tucker, Kanawha, Taylor, and Mingo in the order named. In each of these counties the product in 1899 exceeded that of 1898 by over 100,000 tons.

Coal product of West Virginia from 1895 to 1899, by counties.

[Short tons.]

County.	1895.	1896.	1897.	1898.	1899.	Increase, 1899.	De- crease, 1899.	Per cent of in- crease.	Per cent of de- crease.
Barbour	13,306	24,064	56,054	35,643	79,735	44,092		123.7	
Brooke	74,841	43,424	49,453	78,055	77,246		809		1.04
Fayette	3,264,825	3,533,572	4,001,540	4,592,772	5,039,815	447,043		9.7	
Grant	392	8,720	28	560			560		100.0
Harrison	292,693	231,687	334,817	410,942	641,022	230,080		56.0	
Kanawha	1,134,798	1,116,883	920,161	1,354,500	1,505,141	150,641		11.1	
Logan	24,648								
McDowell	2,395,365	2,883,686	3,235,344	3,904,976	4,290,912	385,936		9.8	
Marion	1,257,563	1,511,903	1,739,846	2,114,352	2,733,161	618,809		29.3	
Marshall	194,077	181,610	147,532	195,232	239,436	44,204		22.6	
Mason	120,766	100,136	120,945	116,026	97,233		18,793		16.2
Mercer	687,364	939,062	915,691	834,169	898,405	64,236		7.7	
Mineral	675,610	556,586	580,520	586,345	628,539	42,194		7.2	
Mingo	26,370	211,593	368,520	377,531	481,150	103,619		27.4	
Monongalia	67,510	43,297	51,307	35,750	51,520	15,770		44.1	
Ohio	169,834	133,525	111,909	136,929	159,857	22,928		16.7	
Preston	107,053	139,759	169,610	232,603	281,414	48,811		21.0	
Putnam	120,482	185,953	110,971	206,407	210,821	4,414		2.1	
Raleigh	88,188	92,136	83,178	99,852	86,088		13,764		13.8
Randolph	200			17,080	47,291	30,211		176.9	
Taylor	98,252	123,354	281,227	260,146	378,765	118,619		45.6	
Tucker	449,991	688,426	844,506	945,217	1,157,470	212,253		22.5	
Wayne	3,833	1,900							
Other coun- ties and small mines.	125,000	125,000	125,000	165,912	167,974	2,062		1.24	
Total ..	11,387,961	12,876,296	14,248,159	16,700,999	19,252,995	2,551,996		15.3	

a Net increase.

In the preceding tables the production has been treated by counties arranged in alphabetical order, but in comparing the production in 1899 with that of preceding years and discussing the wonderful development of the coal-mining industry of the State during recent

years a more comprehensive idea may be obtained by an arrangement of certain important fields according to geographical distribution. With this end in view the following table has been prepared showing the productive development of four principal districts in the State which have been designated as the New and Kanawha River district, the Pocahontas or Flat Top, the Fairmont, and the Upper Potomac or Elk Garden field. The first two districts are in the southern part of the State and are reached by the Chesapeake and Ohio and the Norfolk and Western railroads, respectively. The Fairmont and Upper Potomac fields are in the northern part of the State and are reached by the Baltimore and Ohio and West Virginia Central and Pittsburg railroads. According to the present rate of production the New and Kanawha River district is the most important of the four. It includes the counties of Fayette and Kanawha, and while the coal of the two counties is drawn from two different areas they are drained by the same waters and sent to market over the same railroad, and are considered as one district in this report. In thirteen years the output of this district has nearly trebled, from 2,290,563 short tons in 1886 to 6,544,956 short tons in 1899.

The Pocahontas or Flat Top district embraces McDowell and Mercer counties in West Virginia, and Tazewell County, Virginia. The openings to the mines in Tazewell County are in Virginia, and that county and State are credited with the total product, but most of the coal is taken from the West Virginia side of the line. Prior to 1889 all of the coal from this district was mined in Mercer County, West Virginia, and Tazewell County, Virginia. The mines of McDowell County, opened in 1889, produced in 1891 more than either of the other counties, and since 1893 have produced more than half the total tonnage of the district. In thirteen years the output of this district has increased seven times from 968,484 short tons in 1886 to 6,033,344 short tons in 1899.

The Fairmont region, embracing Harrison and Marion counties, has shown the largest ratio of increase of all the coal-producing districts of West Virginia. The output of this district in 1899 was more than eight times what it was in 1886. The product in 1899 was 3,374,183 short tons as against 2,525,294 short tons in 1898, 2,074,663 tons in 1897, and 406,976 in 1886.

The Upper Potomac or Elk Garden district belongs to an isolated basin, of which the Cumberland field of Maryland forms a part. It is of comparatively limited area, but an important producer. Most of the coal in the district is drawn from the "big vein" which has furnished nearly all of Maryland's product. During the last few years a great deal of development has been done in Tucker County on the Thomas and Davis seams, which are found at a lower horizon than the

"big vein." The production of the district in West Virginia amounted to 1,786,009 tons, as compared with 1,531,562 tons in 1898.

Coal product of the principal districts of West Virginia.

Year.	New and Kanawha River district.	Pocahontas or Flat Top district.	Fairmont or Upper Monongahela district.	Upper Potomac or Elk Garden district.
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1886.....	2, 290, 563	968, 484	406, 976	383, 712
1887.....	2, 379, 296	1, 357, 040	520, 064	503, 343
1888.....	2, 840, 630	1, 912, 695	473, 489	518, 878
1889.....	2, 669, 016	2, 290, 270	456, 582	666, 956
1890.....	3, 012, 414	2, 702, 092	600, 131	819, 062
1891.....	3, 632, 209	3, 137, 012	1, 150, 569	1, 052, 308
1892.....	3, 773, 021	3, 503, 260	1, 141, 430	942, 154
1893.....	4, 099, 112	3, 815, 280	1, 255, 956	1, 129, 397
1894.....	3, 650, 971	5, 059, 025	1, 655, 532	927, 220
1895.....	4, 399, 623	4, 044, 998	1, 550, 256	1, 125, 601
1896.....	4, 650, 455	4, 608, 113	1, 743, 590	1, 245, 012
1897.....	4, 921, 701	4, 859, 373	2, 074, 663	1, 425, 026
1898.....	5, 947, 272	5, 521, 160	2, 525, 294	1, 531, 562
1899.....	6, 544, 956	6, 033, 344	3, 374, 183	1, 786, 009

The annual product of coal in West Virginia is shown in the following table:

Coal product of West Virginia since 1873.

Year.	Short tons.	Year.	Short tons.
1873.....	672, 000	1887.....	4, 881, 620
1874.....	1, 120, 000	1888.....	5, 498, 800
1875.....	1, 120, 000	1889.....	6, 231, 880
1876.....	896, 000	1890.....	7, 394, 654
1877.....	1, 120, 000	1891.....	9, 220, 665
1878.....	1, 120, 000	1892.....	9, 738, 755
1879.....	1, 400, 000	1893.....	10, 708, 578
1880.....	1, 568, 000	1894.....	11, 627, 757
1881.....	1, 680, 000	1895.....	11, 387, 961
1882.....	2, 240, 000	1896.....	12, 876, 296
1883.....	2, 335, 833	1897.....	14, 248, 159
1884.....	3, 360, 000	1898.....	16, 700, 999
1885.....	3, 369, 062	1899.....	19, 252, 995
1886.....	4, 005, 796		

In order to show how steady and regular has been the growth of the coal-mining industry of West Virginia the following table has been prepared, exhibiting the increases each year since 1880. There has been only one break in the series, and the average annual increase has been nearly 1,000,000 short tons:

Annual increase in the coal product of West Virginia since 1880.

Year.	Short tons.
1881 over 1880	112,000
1882 over 1881	560,000
1883 over 1882	95,833
1884 over 1883	1,024,167
1885 over 1884	9,062
1886 over 1885	636,734
1887 over 1886	875,824
1888 over 1887	617,180
1889 over 1888	733,080
1890 over 1889	1,162,774
1891 over 1890	1,826,011
1892 over 1891	518,090
1893 over 1892	969,823
1894 over 1893	919,179
Total increase in fourteen years	10,059,757
Decrease in 1895	239,796
Total increase in fifteen years	9,819,961
1896 over 1895	1,488,335
1897 over 1896	1,371,863
1898 over 1897	2,452,840
1899 over 1898	2,551,996
Total increase in nineteen years	17,684,995
Average annual increase	930,789

WYOMING.

Total product in 1899, 3,837,392 short tons; total value, \$4,742,525.

Wyoming ranks second among the coal-producing States of the Rocky Mountain region and third among all the States west of the Mississippi River. In the amount of increased tonnage during 1899 as compared with 1898 Wyoming excelled all the other Western States. Wyoming's output in 1899 was nearly 1,000,000 tons larger than in 1898, and was nearly three times as large as it was ten years before.

The increased production in 1899 was distributed among all the counties of any producing importance, the greatest gain being made by Uinta County, with an augmented output of 462,034 tons, or nearly 80 per cent, over 1898. Sweetwater County increased its production 388,887 tons, or nearly 30 per cent.

The number of mining machines in use increased from 48 to 56, and the effect of this increase was shown in the tonnage, as the machine-won product increased 10 per cent, from 631,431 tons in 1898 to 693,712 tons in 1899.

Coal product of Wyoming in 1898, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Carbon.....	5	350,450	5,434	16,466		372,350	\$482,449	\$1.30	219	441
Sweetwater.....	8	1,200,403	5,072	40,400		1,245,875	1,394,766	1.12	243	1,474
Uinta.....	3	582,450	4,383	7,000		593,833	869,866	1.46	243	770
Converse.....	2	48,318	1,100	6,000		55,418	69,000	1.25	194	85
Crook.....										
Fremont.....	2		4,350	25		4,375	8,750	2.00	188	8
Johnson.....										
Sheridan.....	3	516,705	1,316	38,556	35,384	591,961	839,359	1.42	258	697
Weston.....										
Total.....	23	2,698,326	21,655	108,447	35,384	2,863,812	3,664,190	1.28	242	3,475

Coal product in Wyoming in 1899, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>				
Carbon.....	6	446,668	6,068	17,410		470,161	\$644,830	\$1.37	248	594
Converse.....	2	51,886	900	6,000		58,786	74,082	1.26	267	65
Fremont.....	4	600	3,468	150		4,218	8,686	2.06	191	13
Sweetwater.....	9	1,531,158	5,504	98,100		1,634,762	1,961,059	1.20	274	1,805
Uinta.....	4	1,024,442	8,882	22,543		1,055,867	1,166,539	1.10	233	1,377
Crook.....	3	12,328	4,187	497		17,012	22,116	1.30	157	58
Johnson.....										
Natrona.....	3	517,585	3,405	43,496	32,100	596,586	865,213	1.45	298	785
Sheridan.....										
Weston.....	3									
Total.....	31	3,584,667	32,429	198,196	32,100	3,837,392	4,742,525	1.24	261	4,697

Distribution of the coal product of Wyoming from 1889 to 1899.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employes.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	Short tons.	Short tons.	Short tons.	Short tons.				
1889.....		1,354,443	15,433	19,071		1,388,947	\$1,748,617			2,675
1890.....		1,835,299	28,540	6,527		1,870,366	3,183,669		246	3,272
1891.....		2,229,401	33,558	60,392	4,490	2,327,841	3,555,275	\$1.53		3,411
1892.....		2,378,657	27,054	96,128	2,000	2,503,839	3,168,776	1.27	225	3,133
1893.....		2,280,685	64,188	87,086	7,352	2,439,311	3,290,904	1.35	189	3,378
1894.....	34	2,303,934	21,482	72,362	13,685	2,417,463	3,170,392	1.31	190	3,032
1895.....	25	2,106,937	35,628	81,065	23,281	2,246,911	2,977,901	1.33	184	3,449
1896.....	28	2,102,468	17,867	68,251	41,038	2,229,624	2,904,185	1.30	209	2,949
1897.....	20	2,435,091	17,845	93,974	50,976	2,597,886	3,136,694	1.21	219	3,137
1898.....	23	2,698,326	21,655	108,447	35,384	2,863,812	3,664,190	1.28	242	3,475
1899.....	31	3,584,667	32,429	188,196	32,100	3,837,392	4,742,525	1.24	261	4,697

The output by counties during the past five years, with the increases and decreases in 1899 as compared with 1898, is presented in the following table:

Coal product of Wyoming since 1895, by counties.

[Short tons.]

County.	1895.	1896.	1897.	1898.	1899.	Increase, 1899.	Decrease, 1899.
Carbon	350,504	363,257	403,891	372,350	470,161	97,811	
Converse	65,090	78,000	79,000	54,818	58,786	3,968	
Sweetwater.....	1,158,125	1,047,042	1,133,434	1,245,875	1,634,762	388,887	
Uinta.....	230,684	313,433	417,984	593,833	1,065,867	462,034	
Weston	348,611	371,528	498,997	508,199	542,649	34,450	
Other counties	93,897	56,364	64,580	88,737	75,167		13,570
Total	2,246,911	2,229,624	2,597,886	2,863,812	3,837,392	973,580	

a Net increase.

In the following table is shown the total product for the State each year since 1868:

Total product of coal in Wyoming.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1868..	6,925	.....	1884..	902,620	.....
1869..	49,382	.....	1885..	807,328	\$2,421,984
1870..	105,295	.....	1886..	829,355	2,488,065
1871..	147,328	.....	1887..	1,170,318	3,510,954
1872..	221,745	.....	1888..	1,481,540	4,444,620
1873..	259,700	.....	1889..	1,388,276	1,748,617
1874..	219,061	.....	1890..	1,870,366	3,183,669
1875..	300,808	.....	1891..	2,327,841	3,555,275
1876..	334,550	.....	1892..	2,503,839	3,168,776
1877..	342,853	.....	1893..	2,439,311	3,290,904
1878..	333,200	.....	1894..	2,417,463	3,170,392
1879..	400,991	.....	1895..	2,246,911	2,977,901
1880..	527,811	.....	1896..	2,229,624	2,904,185
1881..	628,181	.....	1897..	2,597,886	3,136,694
1882..	707,764	.....	1898..	2,863,812	3,664,190
1883..	779,689	.....	1899..	3,837,392	4,742,525

LABOR TROUBLES IN 1899.¹

In proportion to the number of men employed and the relative production, the regions most seriously affected by labor strikes in 1899 were Arkansas and the Indian Territory. In Arkansas the idleness caused by the strikes was directly responsible for a decrease of 361,925 tons in the product of the State, and made Arkansas one of the two coal-producing States which failed to share in the revival of the industrial activity of 1899. The operators in the Indian Territory were more fortunate than their neighbors in Arkansas, in that they were able, by the importation of nonunion labor from other States, to keep their mines in operation the greater part of the year. This strike grew out of the refusal of mine operators to accede to a demand for recognition of the miners' union. It began about the first of March and had not been settled at the close of the year, although most of the mines affected had resumed operations, some with a full complement of miners and laborers. The total number of men made idle by the struggle was 3,866, of which 2,041 were in Arkansas and 1,825 in the Indian Territory. The aggregate working time lost was 497,521 days, of which

¹ Bituminous mines only. Anthracite mines not included.

216,265 were lost in Arkansas and 281,256 in the Territory. The average time lost per man was 106 days in Arkansas and 154 days in the Territory. In no other State did the average time lost per man amount to as much as 65 days. The nearest approach to that figure was made in Colorado, where 504 men were on strike, an average of 62 days, and in Alabama, where 1,135 men were idle, an average of 61 days.

Pennsylvania naturally, on account of its supremacy as a coal producer, reported the largest number of men on strike and the largest total for time lost, but the average time lost per man was only 42 days. Moreover, the strikes were distributed among 70 mines out of a total of 687, so that only 10 per cent of the total number were affected. The 15,131 men on strike represented only 18 per cent of the total number employed and the total days lost only 3 per cent of the total time made. In Arkansas and the Territory, on the other hand, out of 53 mines, 31, or 60 per cent, reported strikes; 3,866 men, or 60 per cent of the total average number employed, were idle, and the total time lost was equivalent to 40 per cent of all the time made.

Taking the country as a whole, 359 mines out of a total of 3,245 were idle some portion of the year by strikes; 45,981 men out of a total of 271,027 employed in the bituminous coal mines of the United States were participants in the strikes, and the total time lost was 2,124,154 working days, as compared with 63,420,318 working days made.

As stated in the footnote, the statistics presented herewith include only the strikes occurring in bituminous mines. No statements regarding the strikes in the anthracite mines of Pennsylvania were obtained. The details of men made idle, time lost, etc., by strikes during 1899 are presented in tabular form in the following statement:

Statistics of labor strikes in the United States in 1899.

State or Territory.	Number of mines re- porting strikes.	Number of men on strike.	Total days lost.	Average number of days lost per man.
Alabama	11	1,135	68,925	61
Arkansas	12	2,041	216,265	106
Colorado	9	504	31,520	62
Illinois	47	7,133	267,171	37
Indiana	30	3,272	132,825	40
Indian Territory	19	1,825	281,256	154
Iowa	34	2,623	72,710	28
Kansas	16	1,986	88,798	45
Kentucky	12	837	24,598	29
Maryland	1	35	420	12
Michigan	5	487	9,547	20
Missouri	30	2,197	117,076	53
Montana	1	650	33,800	52
Ohio	15	877	26,394	30
Pennsylvania	70	15,131	636,160	42
Tennessee	11	1,595	37,085	23
Texas	2	185	2,775	15
West Virginia	34	3,468	76,829	22
Total	359	45,981	2,124,154	46

COKE.

BY EDWARD W. PARKER.

[The unit used in this report is uniformly the ton of 2,000 pounds.]

INTRODUCTION.

This report, dealing primarily with the production of coke in 1899, follows the general style of the preceding reports of the series. In collecting the statistics of production during the past year the writer has acted also as a special agent of the Twelfth Census of the United States, the census schedules being prepared so as to include the inquiries usually made by the Geological Survey. The delay in the publication of the report has been due to difficulty experienced in getting complete replies to the extended inquiries required for the Census report. It is not considered necessary to include in this paper the statistics of capital, labor, wages, etc., as collected for the Census, and readers interested in these subjects are referred to the Census report, which will be published in bulletin form at practically the same time as this report.

In both Census and Survey reports the use of the word "coke" is limited to the product which is obtained from the distillation or partial combustion of bituminous coal in retorts, ovens, or pits, and which may be termed "oven coke." Ordinary gas-house coke, obtained as a by-product in the manufacture of illuminating gas from coal, is not included. Retort-oven coke, however, although the gas may be, as it is in a few instances, the primary product, is considered as coming within the scope of this report. There seems to be no reason to doubt that the by-product ovens will eventually supersede the beehive, at least in great part. The question as to whether the coke from these retort ovens is the primary product or the by-product is determined by the location of the plant and the demands of the particular locality. All of the Semet-Solvay ovens so far erected in this country have been for the production of metallurgical coke with gas as a by-product. The Otto-Hoffman ovens at Johnstown and at Otto, near Pittsburgh, Pennsylvania, have also been constructed for coke as the primary product. The four hundred ovens at Everett, Massachusetts, on the other hand, which have put in blast since our last report, make the gas the primary and coke the secondary product. Other plants in

contemplation or under contract at Philadelphia and other cities will also make the gas the primary product. The coke product from these ovens is certainly not to be considered in the same category as gas-house coke, and it has been decided to include it with the production of blast-furnace and foundry cokes, although not made strictly for that purpose. A large amount of beehive-oven coke is now prepared each year for domestic use, so it is not possible to confine the report to the discussion of metallurgical coke.

The coal used in the manufacture of coke in the United States is drawn from all the five great bituminous coal fields, which are (1) the Appalachian, (2) the Central, (3) the Western, (4) the Rocky Mountain, and (5) the Pacific coast. No coke is produced from the coal of the Triassic fields in North Carolina and eastern Virginia, or of the northern field in Michigan. Fully 95 per cent of the total production is taken from the Appalachian fields, which embrace the great coking regions of Pennsylvania, West Virginia, Alabama, Virginia, and Tennessee, and less important districts in Ohio and eastern Kentucky. About $3\frac{1}{4}$ per cent of the total product is from the Rocky Mountain States, leaving only $1\frac{1}{4}$ per cent to be distributed among the other three fields.

PRODUCTION OF COKE IN THE UNITED STATES.

PRODUCTION IN 1899.

The phenomenal activity in the iron trade during 1899 naturally stimulated the production of coke, and resulted in a coke product of 19,668,569 short tons. This was an increase of 3,621,360 tons, or nearly 23 per cent, over the product of 1898, which was in turn 20 per cent in excess of any previous year. As compared with 1895, the year of largest production prior to 1898, the product in 1899 shows an increase of over 47 per cent. The unusual demand for coke throughout the entire year caused also an advance in price, the average for the year being \$1.75 per ton, the highest point attained with one exception since 1892. The total value of the product in 1899 was \$34,670,417, an increase of \$9,083,718, or 35.5 per cent, as compared with 1898, and of over 50 per cent as compared with 1897. In spite of this proportionately larger gain in value, many coke producers found the year's business unprofitable and in some cases a decidedly losing one. This was due to the advanced wages and higher cost of coal, while most of the coke was sold on long contract at prices which were below the cost of production in 1899.

It will be seen from the following tables that all of the more important coke-producing States shared in the increased production in 1899. In order to preserve the confidential nature of the returns, the production of New York and Massachusetts is included with Pennsylvania; Illinois is combined with Indiana, and Utah with Colorado. The com-

bined product of Illinois and Indiana was less than the two States produced in 1898. Several ovens were abandoned in each State during 1899. The product of the Indian Territory also showed a decrease, as did the product of Ohio, Wisconsin and Wyoming. The total decrease in all of these States, however, amounted to but 17,771 tons, an insignificant amount when considered with the increases in other States.

The number of establishments in 1899 was 344, an increase of 2 over 1898, and of 8 over 1897. The total number of ovens in existence at the close of 1889 was 49,667, against 48,447 in 1898, and 47,668 in 1897. The number of ovens building on December 31, 1899, was 4,037 as compared with 1,048 in 1898, and 545 in 1897. The ovens operated in 1899 included 280 Semet-Solvay, 680 Otto-Hoffman, and 60 Newton-Chambers, a total of 1,020 by-product ovens, as compared with 520 in 1898, and 280 in 1897. There were 65 by-product ovens building at the close of 1899.

In the following table is shown a statement of the production of coke in 1899, by States, followed, for purposes of comparison, by similar tables for 1898 and 1897:

Manufacture of coke in the United States, by States and Territories, in 1899.

State or Territory.	Estab-lish-ments.	Ovens.		Coal used.	Yield of coal in coke.	Coke pro-duced.	Total value of coke.	Value of coke per ton.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Per cent.</i>	<i>Short tons.</i>		
Alabama	25	5,599	860	3,028,472	59	1,787,809	\$3,634,471	\$2.08
Colorado (a).....	12	1,243	50	898,207	59	580,424	1,333,769	2.51
Georgia	2	350	100	78,098	65.2	50,907	116,917	2.30
Illinois	3	130	26	4,217	56.2	2,370	5,565	2.35
Indiana	2	52	0					
Indian Territory ..	3	130	100	59,255	41	24,339	71,965	2.96
Kansas	9	95	0	26,988	58.6	14,476	30,817	2.13
Kentucky	6	300	130	151,508	58.5	81,095	161,454	1.99
Massachusetts (b)...	1	400	0	5,320	58.8	2,860	5,520	1.93
Missouri	4	12	0					
Montana	3	303	0	110,274	51	56,376	356,190	6.32
New Mexico.....	3	190	0	68,694	64.3	44,134	99,217	2.25
New York (b)	1	25	5	142,678	58.8	83,878	255,129	3.04
Ohio.....	8	385	0					
Pennsylvania	150	27,591	1,666	19,980,419	68.1	13,577,870	22,881,910	1.69
Tennessee	14	2,040	62	779,995	55.8	435,308	850,686	1.95
Utah (a)	1	104	0	994,635	62.2	618,707	1,071,284	1.73
Virginia	6	1,588	429					
Washington	2	90	0	50,813	59.8	30,372	151,216	4.98
West Virginia	87	8,846	619	3,802,825	60	2,278,577	3,480,408	1.53
Wisconsin	1	120	0	54,950	60.8	33,437	125,389	3.75
Wyoming	1	74	0	32,100	48.7	15,630	38,510	2.46
Total	344	49,667	4,037	30,219,343	65.1	19,668,569	34,670,417	1.76

a Colorado includes production of Utah.

b Production included in Pennsylvania.

c Includes 280 Semet-Solvay, 680 Otto-Hoffman, and 60 Newton-Chambers by-product ovens.

d Includes 65 Semet-Solvay ovens.

Manufacture of coke in the United States, by States and Territories, in 1898.

State or Territory.	Estab- lish- ments.	Ovens.		Coal used.	Yield of coal in coke.	Coke pro- duced.	Total value of coke.	Value of coke per ton.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Per cent.</i>	<i>Short tons.</i>		
Alabama	25	5,456	100	2,814,615	59	1,663,020	\$3,378,946	\$2.03
Colorado (a)	12	1,253	3	803,686	59.1	474,808	1,230,428	2.59
Georgia	2	350	0	81,108	61	49,529	77,230	1.56
Illinois	2	126	0	6,650	35	2,325	4,686	2.02
Indiana	2	94	0	4,065	44.9	1,825	3,194	1.75
Indian Territory...	2	130	0	73,330	46.5	34,110	96,639	2.833
Kansas	6	47	50	7,856	58	4,180	6,455	1.544
Kentucky	5	292	2	44,484	50	22,242	32,213	1.448
Massachusetts	1	0	400	0	0	0	0	0
Missouri	3	8	0	1,500	49.3	740	1,050	1.42
Montana	4	318	0	92,552	56	52,009	359,174	6.906
New Mexico	3	190	0	12,557	55.6	6,980	14,625	2.096
New York (b)	1	25	0					
Ohio	10	441	0	134,757	63.5	85,535	211,558	2.47
Pennsylvania (c) ..	151	27,157	292	16,307,841	65.7	10,715,302	16,078,505	1.50
Tennessee	15	1,949	40	722,356	54.6	394,545	642,920	1.63
Utah (d)	1	104	0					
Virginia	6	1,564	0	852,972	62	531,161	699,781	1.317
Washington	2	90	0	48,559	62.2	30,197	128,933	4.27
West Virginia	87	8,659	161	3,145,398	61.2	1,925,071	2,432,657	1.26
Wisconsin	1	120	0	59,900	59	35,280	123,480	3.50
Wyoming	1	74	0	35,384	51.9	18,350	64,225	3.50
Total	342	48,447	1,048	25,249,570	63.6	16,047,209	25,586,699	1.594

a Includes production of Utah.

b Production included with Pennsylvania.

c Includes production of New York.

d Production included with Colorado.

e Includes 280 Semet-Solvay, 180 Otto-Hoffman, and 60 Newton-Chambers by-product ovens.

f Includes 500 Otto-Hoffman ovens.

COKE.

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Manufacture of coke in the United States, by States and Territories, in 1897.

State or Territory.	Estab- lish- ments.	Ovens.		Coal used.	Yield of coal in coke.	Coke pro- duced.	Total value of coke.	Value of coke per ton.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Per cent.</i>	<i>Short tons.</i>		
Alabama	25	5,365	<i>a</i> 120	2,451,475	58.8	1,443,017	\$3,094,461	\$2.14
Colorado (<i>b</i>)	12	<i>c</i> 1,273	0	616,592	55.6	342,653	999,216	2.916
Georgia	1	300	0	67,000	49.3	33,000	42,240	1.28
Illinois	2	126	0	3,501	43	1,549	2,895	1.87
Indiana	2	94	0	7,022	41.4	2,904	5,795	1.995
Indian Territory...	2	130	0	63,495	44.3	30,364	104,725	3.45
Kansas	4	57	0	11,772	52.5	6,181	9,272	1.50
Kentucky	5	268	0	64,234	50	32,117	45,454	1.41
Missouri	3	15	0	4,627	56	2,593	3,890	1.50
Montana	3	303	0	139,907	48.5	67,849	467,481	6.89
New Mexico	2	126	0	2,585	55.6	1,438	3,232	2.25
New York (<i>d</i>)	1	25	0					
Ohio	9	433	0	151,545	62.7	95,067	235,784	2.48
Pennsylvania (<i>e</i>) ..	153	26,910	307	13,538,646	66.2	8,966,924	13,727,966	1.53
Tennessee	15	1,948	0	667,996	55	368,769	667,656	1.81
Texas	1	20	0	700	56.3	394		
Utah (<i>f</i>)	1	104	0					
Virginia	6	1,458	110	574,542	61.6	354,067	495,864	1.40
Washington	3	120	0	39,124	67	26,189	115,754	4.42
West Virginia	84	8,404	38	2,413,283	61	1,472,666	1,933,808	1.31
Wisconsin	1	120	0	29,207	59	17,216	75,000	4.36
Wyoming	1	74	0	54,976	43.7	24,007	72,021	3.00
Total	336	47,668	575	20,907,319	63.5	13,288,984	22,102,514	1.663

a Semet-Solvay ovens.

b Includes coal used, coke produced, and its value in Utah.

c Includes 36 gas retorts.

d Production included with Pennsylvania.

e Includes coal used, coke produced, and its value in New York.

f Production included with Colorado.

MINERAL RESOURCES.

The increases and decreases in the several States during 1899, as compared with 1898, are shown in the following table:

Increases and decreases in coke production, by States, in 1899, as compared with 1898.

State or Territory.	Increase, 1899.		Decrease, 1899.	
	Amount of increase.	Per cent of increase.	Amount of decrease.	Per cent of decrease.
	<i>Short tons.</i>		<i>Short tons.</i>	
Alabama	124, 789	7. 5		
Colorado (a)	55, 616	11. 7		
Georgia	1, 378	2. 78		
Illinois	}		1, 780	42. 89
Indiana				
Indian Territory			9, 771	28. 65
Kansas	10, 296	246. 3		
Kentucky	58, 853	264. 6		
Missouri	2, 120	286. 49		
Montana	4, 367	8. 4		
New Mexico	37, 154	532. 29		
Ohio			1, 657	1. 94
Pennsylvania, New York, and Massachusetts	2, 862, 568	26. 7		
Tennessee	40, 763	10. 3		
Virginia	87, 546	16. 5		
Washington	175	. 58		
West Virginia	353, 506	18. 36		
Wisconsin			1, 843	5. 22
Wyoming			2, 720	14. 82
Total	63, 621, 360	22. 57		

a Including Utah.

b Net increase.

In the following table are consolidated the statistics of the manufacture of coke in the United States from 1880 to 1899, inclusive:

Statistics of the manufacture of coke in the United States, 1880 to 1899, inclusive.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
1880	186	12, 372	1, 159	5, 237, 741	3, 338, 300	\$6, 631, 267	\$1. 99	63
1881	197	14, 119	1, 005	6, 546, 662	4, 113, 760	7, 725, 175	1. 88	63
1882	215	16, 356	712	7, 577, 648	4, 793, 321	8, 462, 167	1. 77	63
1883	231	18, 304	407	8, 516, 670	5, 464, 721	8, 121, 607	1. 49	64
1884	250	19, 557	812	7, 951, 974	4, 873, 805	7, 242, 878	1. 49	61
1885	233	20, 116	432	8, 071, 126	5, 106, 696	7, 629, 118	1. 49	63
1886	222	22, 597	4, 154	10, 688, 972	6, 845, 369	11, 153, 366	1. 63	64
1887	270	26, 001	3, 584	11, 859, 752	7, 611, 705	15, 321, 116	2. 01	64
1888	261	30, 059	2, 587	12, 945, 350	8, 540, 030	12, 445, 963	1. 46	66
1889	252	34, 165	2, 115	15, 960, 973	10, 258, 022	16, 630, 301	1. 62	64
1890	253	37, 158	1, 547	18, 005, 209	11, 508, 021	23, 215, 302	2. 02	64
1891	243	40, 245	911	16, 344, 540	10, 352, 688	20, 323, 216	1. 97	63
1892	261	42, 002	1, 893	18, 813, 337	12, 010, 829	23, 536, 141	1. 96	64
1893	258	44, 201	717	14, 917, 146	9, 477, 580	16, 523, 714	1. 74	63. 5
1894	260	44, 772	591	^a 14, 348, 750	9, 203, 632	^a 12, 328, 856	1. 34	64
1895	265	45, 565	638	20, 848, 323	13, 333, 714	^b 19, 234, 319	1. 44	64
1896	341	46, 944	383	18, 694, 422	11, 788, 773	21, 660, 729	1. 837	63
1897	336	47, 668	575	20, 907, 319	13, 288, 984	22, 102, 514	1. 663	63. 5
1898	342	48, 447	1, 048	25, 249, 570	16, 047, 209	25, 586, 699	1. 594	63. 6
1899	344	49, 667	4, 037	30, 219, 343	19, 668, 569	34, 670, 417	1. 76	65. 1

^a Excluding New York.

^b Excluding New York and Texas.

TOTAL NUMBER OF COKE WORKS IN THE UNITED STATES.

The following table gives the number of establishments manufacturing coke in the United States at the close of each year from 1880 to 1899, by States. According to this table the number of establishments in the last four years has largely increased. The increase is only apparent. Prior to 1896 it was customary to include under one establishment all coke works reported from one general office, and to consider them separate establishments when reported individually from the central office. In the statistics for 1896, 1897, 1898, and 1899, the word "establishment" is used to designate the number of banks or batteries of ovens which were in operation, whether reported from one office or not. When one company reported production at two or more banks of ovens, each is considered a separate establishment.

Number of establishments in the United States manufacturing coke on December 31 of each year from 1880 to 1899.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Alabama	4	4	5	6	8	11	14	15	18	19
Colorado	1	2	5	7	8	7	7	7	7	9
Georgia	1	1	1	1	1	2	2	2	1	1
Illinois	6	6	7	7	9	9	9	8	8	4
Indiana	2	2	2	2	2	2	4	4	3	4
Indian Territory	1	1	1	1	1	1	1	1	1	1
Kansas	2	3	3	4	4	4	4	4	6	6
Kentucky	5	5	5	5	5	5	6	6	10	9
Missouri	0	0	0	0	0	0	0	1	1	3
Montana	0	0	0	1	3	2	4	2	1	2
New Mexico	0	0	2	2	2	2	2	1	1	2
Ohio	15	15	16	18	19	13	15	15	15	13
Pennsylvania	124	132	137	140	145	133	108	151	120	109
Tennessee	6	6	8	11	13	12	12	11	11	12
Texas	0	0	0	0	0	0	1	0	0	0
Utah	1	1	1	1	1	1	1	0	0	1
Virginia	0	0	0	1	1	1	2	2	2	2
Washington	0	0	0	0	1	1	1	1	3	1
West Virginia	18	19	22	24	27	27	29	39	52	53
Wisconsin	0	0	0	0	0	0	0	0	1	1
Wyoming	0	0	0	0	0	0	0	0	0	1
Total	186	197	215	231	250	233	222	270	261	253

State or Territory.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Alabama	20	21	20	23	22	22	24	25	25	25
Colorado	8	7	9	8	8	9	11	12	12	12
Georgia	1	1	1	1	1	1	1	1	2	2
Illinois	4	1	1	1	1	3	3	2	2	3
Indiana	4	2	2	2	2	2	2	2	2	2
Indian Territory	1	1	1	1	1	1	2	2	2	3
Kansas	7	6	6	6	6	5	6	4	6	9
Kentucky	9	7	5	4	6	5	4	5	5	6
Massachusetts	0	0	0	0	0	0	0	0	1	1
Missouri	3	3	3	3	3	3	3	3	3	4
Montana	2	2	2	2	2	3	3	3	4	3
New Mexico	2	1	1	1	1	1	1	2	3	3
New York	0	0	0	1	1	1	1	1	1	1
Ohio	13	9	10	9	8	8	9	9	10	8

Number of establishments in the United States manufacturing coke on December 31 of each year from 1880 to 1899—Continued.

State or Territory.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Pennsylvania	106	109	109	102	101	99	158	153	151	150
Tennessee	11	11	11	11	11	12	15	15	15	14
Texas	0	0	0	0	0	1	1	1	0	0
Utah	1	1	1	1	1	1	1	1	1	1
Virginia	2	2	2	2	2	5	7	6	6	6
Washington	2	2	3	3	3	3	3	3	2	2
West Virginia	55	55	72	75	78	78	84	84	87	87
Wisconsin	1	1	1	1	1	1	1	1	1	1
Wyoming	1	1	1	1	1	1	1	1	1	1
Total	253	243	261	258	260	265	341	336	342	344

The number of establishments in the country for each year since 1850 for which there are any returns is as follows:

Number of coke establishments in the United States since 1850.

Year.	Number.	Year.	Number.
1850 (census year)	4	1888, December 31	261
1860 (census year)	21	1889, December 31	253
1870 (census year)	25	1890, December 31	253
1880 (census year)	149	1891, December 31	243
1880, December 31	186	1892, December 31	261
1881, December 31	197	1893, December 31	258
1882, December 31	215	1894, December 31	260
1883, December 31	231	1895, December 31	265
1884, December 31	250	1896, December 31	341
1885, December 31	233	1897, December 31	336
1886, December 31	222	1898, December 31	342
1887, December 31	270	1899, December 31	344

As previously stated, the "number of establishments" in the last four years refers to the number of banks or batteries of ovens from which reports were received. Previously it was used to designate the number of firms or corporations engaged in coke making. The number of firms engaged in the industry in 1899 was 273, an increase in sixteen years of only a little more than 18 per cent, whereas, as shown in the next table, the number of coke ovens has increased 176 per cent. In the same period the coke product has increased over 200 per cent, illustrating very clearly the tendency of carrying on large indus-

trial enterprises under one management rather than to distribute the business among a larger number of smaller concerns. In 1883 the average number of ovens to each firm or corporation was 79, and the average yearly production by each firm about 23,600 tons. In 1899 the average number of ovens to a firm was 182, and the average production per firm 72,046 tons, showing that while the number of firms has increased only about 18 per cent in sixteen years, the average number of ovens to each has increased 130 per cent, and the average production per firm 205 per cent.

Of the 273 firms and corporations from whom reports were received in 1899, 22 produced no coke. The total number of ovens owned by these 22 firms was 1,302, an average of 54 ovens each. Nearly all of the idle concerns were small producers. In addition to these there were 2,252 ovens idle, which were portions of plants that produced coke in 1899. The total number of ovens idle in 1899 was 3,554, which deducted from the whole number of 49,667, leaves 46,113 ovens in active operation during the year. These distributed among the 251 active firms made an average of 188 ovens to each, as against an average of 54 for the idle ones.

NUMBER OF COKE OVENS IN THE UNITED STATES.

In the following table is presented a statement showing the number of ovens in existence in each State and Territory on December 31 of each year since 1880. In the earlier years covered by this table some coke was made in pits and on the ground, but in later years little, if any, coke has been made except in ovens. Even when testing the adaptability of certain coals for coke making, it has been found advisable to ship the coals, frequently considerable distances, to where the experiments were to be made in ovens, beehive and by-product, so that a better judgment may be formed as to the proper kind of oven to be constructed.

The last four years have seen a noticeable increase in the number of by-product ovens built in the United States. In 1896 there were 160 by-product ovens in operation, exclusive of 30 Newton-Chambers ovens at Latrobe, Pennsylvania, and 3 Slocum ovens at Bolivar, which have not been operated as by-product ovens. At the close of 1897 there were 280 by-product ovens in operation. In December, 1898, there were 520 in existence and 500 more under construction. The statistics for 1899 show 1,020 retort ovens in operation and 65 building.

Number of coke ovens in the United States on December 31 of each year from 1880 to 1899.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Alabama.....	316	416	536	767	976	1,075	1,301	1,555	2,475	3,944
Colorado.....	200	267	344	352	409	434	483	532	602	834
Georgia.....	140	180	220	264	300	300	300	300	290	300
Illinois.....	176	176	304	316	325	320	335	278	221	149
Indiana.....	45	45	37	37	37	37	100	119	103	111
Indian Ter.....	20	20	20	20	20	40	40	80	80	78
Kansas.....	6	15	20	23	23	23	36	39	58	68
Kentucky.....	45	45	45	45	45	33	76	98	132	166
Missouri.....	0	0	0	0	0	0	0	4	4	9
Montana.....	0	0	0	2	5	2	16	27	40	90
New Mexico....	0	0	0	12	70	70	70	70	70	70
New York.....	0	0	0	0	0	0	0	0	0	0
Ohio.....	616	641	647	662	732	642	560	585	547	462
Pennsylvania..	9,501	10,881	12,424	13,610	14,285	14,553	16,314	18,294	20,281	22,143
Tennessee.....	656	724	861	992	1,105	1,387	1,485	1,560	1,634	1,639
Texas.....	0	0	0	0	0	0	0	0	0	0
Utah.....	20	20	20	20	20	20	20	0	0	34
Virginia.....	0	0	0	200	200	200	350	350	550	550
Washington....	0	0	0	0	0	2	11	30	30	30
West Virginia..	681	689	878	962	1,005	978	1,100	2,080	2,792	3,438
Wisconsin.....	0	0	0	0	0	0	0	0	50	50
Wyoming.....	0	0	0	0	0	0	0	0	0	0
Total.....	12,872	14,119	16,356	18,304	19,557	20,116	22,597	26,001	30,069	34,165

State or Territory.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Alabama.....	4,806	5,068	5,320	5,548	5,551	5,658	5,363	5,365	5,456	5,599
Colorado.....	916	948	1,128	1,154	1,154	1,169	1,275	1,273	1,253	1,243
Georgia.....	300	300	300	338	338	330	334	300	350	350
Illinois.....	148	25	24	24	24	129	127	126	126	130
Indiana.....	101	84	84	94	94	94	94	94	94	52
Indian Ter.....	78	80	80	80	80	80	130	130	130	130
Kansas.....	68	72	75	75	61	55	55	57	47	95
Kentucky.....	175	115	287	283	293	298	284	268	292	300
Massachusetts..										400
Missouri.....	10	10	10	10	10	10	7	15	8	12
Montana.....	140	140	153	153	153	303	303	303	318	303
New Mexico....	70	a 0	50	50	50	50	50	126	190	190
New York.....	0	0	0	12	12	12	25	25	25	25
Ohio.....	443	421	436	435	363	377	431	433	441	385
Pennsylvania..	23,430	25,324	25,366	25,744	25,824	26,042	26,658	26,910	27,157	27,591
Tennessee.....	1,664	1,995	1,941	1,942	1,860	1,903	1,861	1,948	1,949	2,040
Texas.....	0	0	0	0	0	6	60	20	0	0
Utah.....	80	80	83	83	83	84	104	104	104	104
Virginia.....	550	550	594	594	736	832	1,138	1,453	1,564	1,588
Washington....	30	80	84	84	84	110	120	120	90	90
West Virginia..	4,060	4,621	5,843	7,354	7,858	7,834	8,351	8,404	8,659	8,846
Wisconsin.....	70	120	120	120	120	120	120	120	120	120
Wyoming.....	20	24	24	24	24	74	74	74	74	74
Total.....	37,158	40,067	42,002	44,201	44,772	45,565	46,944	47,668	48,447	49,667

a Coke was made in pits.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Alabama	100	120	0	122	242	16	1, 012	1, 362	406	427
Colorado	50	0	0	0	24	0	0	0	100	50
Georgia	40	40	44	36	0	0	0	0	0	0
Illinois	0	0	0	0	0	0	0	0	0	0
Indiana	0	0	0	0	0	0	18	0	0	0
Indian Territory	0	0	0	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	2	0	2	100
Missouri	0	0	0	0	0	0	0	0	0	0
Montana	0	0	0	0	12	0	0	0	0	50
New Mexico	0	0	12	28	0	0	0	0	0	0
New York	0	0	0	0	0	0	0	0	0	0
Ohio	25	0	0	0	0	0	0	223	12	0

COKE.

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Number of coke ovens building in the United States at the close of each year from 1880 to 1899—Continued.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Pennsylvania . . .	836	761	642	211	232	317	2,558	802	1,565	567
Tennessee	68	84	14	10	175	36	126	165	84	40
Texas	0	0	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	100	300	0	250
Washington	0	0	0	0	0	0	21	0	100	0
West Virginia . . .	40	0	0	0	127	63	317	742	318	631
Wisconsin	0	0	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	0	0	0
Total	1,159	1,005	712	407	812	432	4,154	3,594	2,587	2,115

State or Territory.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Alabama	371	50	90	60	50	50	0	a 120	100	850
Colorado	30	21	220	200	250	0	0	0	3	50
Georgia	0	0	0	0	0	0	0	0	0	100
Illinois	0	0	0	0	0	0	0	0	0	26
Indiana	0	0	0	0	0	0	0	0	0	0
Indian Territory	0	0	0	0	0	0	0	0	0	100
Kansas	0	0	0	0	0	0	0	0	50	0
Kentucky	303	24	100	100	0	0	0	0	2	130
Massachusetts . . .	0	0	0	0	0	0	0	0	b 400	0
Missouri	0	0	0	0	0	0	0	0	0	0
Montana	0	0	0	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0	0	0	0
New York	0	0	0	0	a 13	a 13	0	0	0	f 5
Ohio	1	0	0	0	0	0	0	0	0	0
Pennsylvania . . .	74	11	269	19	118	c 170	d 154	307	e 292	1,666
Tennessee	292	0	0	0	0	0	100	0	40	62
Texas	0	0	0	0	0	0	0	0	0	0
Utah	0	0	0	0	0	0	0	0	0	0
Virginia	250	250	206	206	100	350	101	110	0	429
Washington	80	0	30	0	0	0	0	0	0	0
West Virginia . . .	334	555	978	132	60	55	28	38	161	g 619
Wisconsin	0	0	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	0	0	0
Total	1,735	911	1,893	717	591	638	383	575	1,048	4,037

a Semet-Solvay ovens.

b Otto-Hoffman ovens.

c Includes 60 Otto-Hoffman and 50 Semet-Solvay ovens.

d Includes 120 Otto-Hoffman ovens.

f Semet-Solvay ovens.

e Includes 100 Otto-Hoffman ovens.

g Includes 60 Semet-Solvay ovens.

PRODUCTION OF COKE SINCE 1880, BY STATES.

A statement of the amount of coke produced in each State and Territory during the last twenty years is presented in the following table. It exhibits an interesting history of the growth of the industry in each State. The total production in 1899 was 20 per cent in excess of that of 1898, double that of 1894, more than three times that of 1886, four times that of 1882, and nearly six times that of 1880.

Amount of coke produced in the United States from 1880 to 1899, inclusive, by States and Territories.

[Short tons.]

State or Territory.	1880.	1881.	1882.	1883.	1884.
Alabama	60,781	109,033	152,940	217,531	244,009
Colorado	25,568	48,587	102,105	133,997	115,719
Georgia	38,041	41,376	46,602	67,012	79,268
Illinois	12,700	14,800	11,400	13,400	13,095
Indiana	0	0	0	0	0
Indian Territory ..	1,546	1,768	2,025	2,573	1,912
Kansas	3,070	5,670	6,080	8,430	7,190
Kentucky	4,250	4,370	4,070	5,025	2,223
Missouri	0	0	0	0	0
Montana	0	0	0	0	75
New Mexico	0	0	1,000	3,905	18,282
New York	0	0	0	0	0
Ohio	100,596	119,469	103,722	87,834	62,709
Pennsylvania	2,821,384	3,437,708	3,945,034	4,438,464	3,822,128
Tennessee	130,609	143,853	187,695	203,691	219,723
Texas	0	0	0	0	0
Utah	1,000	0	250	0	0
Virginia	0	0	0	25,340	63,600
Washington	0	0	0	0	400
West Virginia	138,755	187,126	230,398	257,519	223,472
Wisconsin	0	0	0	0	0
Wyoming	0	0	0	0	0
Total	3,338,300	4,113,760	4,793,321	5,464,721	4,873,805

Amount of coke produced in the United States from 1880 to 1899, inclusive, by States and Territories—Continued.

[Short tons.]

State or Territory.	1885.	1886.	1887.	1888.	1889.
Alabama	301, 180	375, 054	325, 020	508, 511	1, 030, 510
Colorado	131, 960	142, 797	170, 698	179, 682	187, 638
Georgia	70, 669	82, 680	79, 241	83, 721	94, 727
Illinois	10, 350	8, 103	9, 198	7, 410	11, 583
Indiana	0	6, 124	17, 658	11, 956	8, 301
Indian Territory ..	3, 584	6, 351	10, 060	7, 502	6, 639
Kansas	8, 050	12, 493	14, 950	14, 831	13, 910
Kentucky	2, 704	4, 528	14, 565	23, 150	13, 021
Missouri	0	0	2, 970	2, 600	5, 275
Montana	175	0	7, 200	12, 000	14, 043
New Mexico	17, 940	10, 236	13, 710	8, 540	3, 460
New York	0	0	0	0	0
Ohio	39, 416	34, 932	93, 004	67, 194	75, 124
Pennsylvania	3, 991, 805	5, 406, 597	5, 832, 849	6, 545, 779	7, 659, 055
Tennessee	218, 842	368, 139	396, 979	385, 693	359, 710
Texas	0	0	0	0	0
Utah	0	0	0	0	761
Virginia	49, 139	122, 352	166, 947	149, 199	146, 528
Washington	311	825	14, 625	0	3, 841
West Virginia	260, 571	264, 158	442, 031	531, 762	607, 880
Wisconsin	0	0	0	500	16, 016
Wyoming	0	0	0	0	0
Total	5, 106, 696	6, 845, 369	7, 611, 705	8, 540, 030	10, 258, 022

State or Territory.	1890.	1891.	1892.	1893.	1894.
Alabama	1, 072, 942	1, 282, 496	1, 501, 571	1, 168, 085	923, 817
Colorado	245, 756	277, 074	365, 920	346, 981	301, 140
Georgia	102, 233	103, 057	81, 807	90, 726	92, 029
Illinois	5, 000	5, 200	3, 170	2, 200	2, 200
Indiana	6, 013	3, 798	2, 207	5, 724	6, 551
Indian Territory ..	6, 639	9, 464	3, 569	7, 135	3, 051
Kansas	12, 311	14, 174	9, 132	8, 565	8, 439
Kentucky	12, 343	33, 777	36, 123	48, 619	29, 748
Missouri	6, 136	6, 872	7, 299	5, 905	2, 250
Montana	14, 427	29, 009	34, 557	29, 945	17, 388
New Mexico	2, 050	2, 300	0	5, 803	6, 529
New York	0	0	0	12, 850	16, 500
Ohio	74, 633	38, 718	51, 818	22, 436	32, 640

MINERAL RESOURCES.

Amount of coke produced in the United States, from 1880 to 1899, inclusive, by States and Territories—Continued.

[Short tons.]

State or Territory.	1890.	1891.	1892.	1893.	1894.
Pennsylvania	8,560,245	6,954,846	8,327,612	6,229,051	6,063,777
Tennessee	348,728	364,318	354,096	265,777	292,646
Texas	0	0	0	0	0
Utah	8,528	7,949	7,309	16,005	16,056
Virginia	165,847	167,516	147,912	125,092	180,091
Washington	5,837	6,000	7,177	6,731	5,245
West Virginia	833,377	1,009,051	1,034,750	1,062,076	1,193,933
Wisconsin	24,976	34,387	33,800	14,958	4,250
Wyoming	0	2,682	0	2,916	4,352
Total	11,508,021	10,352,688	12,010,829	9,477,580	9,203,632

State or Territory.	1895.	1896.	1897.	1898.	1899.
Alabama	1,444,339	1,479,437	1,443,017	1,663,020	1,787,809
Colorado	317,838	343,313	319,036	445,982	c 530,424
Georgia	60,212	53,673	33,000	49,529	50,907
Illinois	2,250	2,600	1,549	2,325	} 2,370
Indiana	4,804	4,353	2,904	1,825	
Indian Territory ..	5,175	21,021	30,364	34,110	24,339
Kansas	5,287	4,785	6,181	4,180	14,476
Kentucky	25,460	27,107	32,117	22,242	81,095
Massachusetts	0	0	0	0	(a)
Missouri	2,028	2,500	2,593	740	2,860
Montana	25,337	60,078	67,849	52,009	56,376
New Mexico	14,663	24,228	1,438	6,980	44,134
New York	18,521	(a)	(a)	(a)	(a)
Ohio	29,050	80,868	95,087	85,535	83,878
Pennsylvania	9,404,215	b 7,356,502	b 8,966,924	b 10,715,302	b 13,577,870
Tennessee	396,790	339,202	368,769	394,545	435,308
Texas	286	0	394	0	0
Utah	22,519	20,447	23,617	28,826	(c)
Virginia	244,738	268,081	354,067	531,161	618,707
Washington	15,129	25,949	26,189	30,197	30,372
West Virginia	1,285,206	1,649,755	1,472,666	1,925,071	2,278,577
Wisconsin	4,972	5,332	17,216	35,280	33,437
Wyoming	4,895	19,542	24,007	18,350	15,630
Total	13,333,714	11,788,773	13,288,984	16,047,209	19,668,569

a Included with Pennsylvania.

b Includes production of New York, and for Massachusetts also in 1899.

c Colorado includes Utah.

VALUE AND AVERAGE SELLING PRICE OF COKE.

In the following table is given the total value of coke produced in the United States in each year from 1880 to 1899, inclusive. The great increase in 1899 as compared with any previous year is especially worthy of note:

Total value at the ovens of the coke made in the United States from 1880 to 1899, inclusive, by States and Territories.

State or Territory.	1880.	1881.	1882.	1883.	1884.
Alabama	\$183,063	\$326,819	\$425,940	\$598,473	\$609,185
Colorado	145,226	267,156	476,665	584,578	409,930
Georgia	81,789	88,753	100,194	147,166	169,192
Illinois	41,950	45,850	29,050	28,200	25,639
Indiana	0	0	0	0	0
Indian Territory ..	4,638	5,304	6,075	7,719	5,736
Kansas	6,000	10,200	11,460	16,560	14,580
Kentucky	12,250	12,630	11,530	14,425	8,760
Missouri	0	0	0	0	0
Montana	0	0	0	0	900
New Mexico	0	0	6,000	21,478	91,410
New York	0	0	0	0	0
Ohio	255,905	297,728	266,113	225,660	156,294
Pennsylvania	5,255,040	5,898,579	6,133,698	5,410,387	4,783,230
Tennessee	316,607	342,585	472,505	459,126	428,870
Utah	10,000	0	2,500	0	0
Virginia	0	0	0	44,345	111,300
Washington	0	0	0	0	1,900
West Virginia	318,797	429,571	520,437	563,490	425,952
Wisconsin	0	0	0	0	0
Wyoming	0	0	0	0	0
Total	6,631,265	7,725,175	8,462,167	8,121,607	7,242,878

State or Territory.	1885.	1886.	1887.	1888.	1889.
Alabama	\$755,645	\$993,302	\$775,090	\$1,189,679	\$2,372,417
Colorado	512,162	569,120	682,778	716,305	643,479
Georgia	144,198	179,031	174,410	177,907	149,059
Illinois	27,798	21,487	19,594	21,038	29,764
Indiana	0	17,953	51,141	31,993	25,922
Indian Territory ..	12,902	22,229	33,435	21,755	17,957
Kansas	13,255	19,204	28,575	29,073	26,593
Kentucky	8,499	10,082	31,730	47,244	29,769

MINERAL RESOURCES.

Total value at the ovens of the coke made in the United States from 1880 to 1899, inclusive, by States and Territories—Continued.

State or Territory.	1885.	1886.	1887.	1888.	1889.
Missouri.....	0	0	\$10,395	\$9,100	\$5,800
Montana.....	\$2,063	0	72,000	96,000	122,023
New Mexico.....	89,700	\$51,180	82,260	51,240	18,408
New York.....	0	0	0	0	0
Ohio.....	109,723	94,042	245,981	166,330	188,222
Pennsylvania.....	4,981,656	7,664,023	10,746,352	8,230,759	10,743,492
Tennessee.....	398,459	687,865	870,900	490,491	731,496
Utah.....	0	0	0	0	3,042
Virginia.....	85,993	305,880	417,368	260,000	325,861
Washington.....	1,477	4,125	102,375	0	30,728
West Virginia.....	485,588	513,843	976,732	905,549	1,074,177
Wisconsin.....	0	0	0	1,500	92,092
Wyoming.....	0	0	0	0	0
Total.....	7,629,118	11,153,366	15,321,116	12,445,963	16,630,301

State or Territory.	1890.	1891.	1892.	1893.	1894.
Alabama.....	\$2,589,447	\$2,986,242	\$3,464,623	\$2,648,632	\$1,871,348
Colorado.....	959,246	896,984	a1,234,320	a1,137,488	a903,970
Georgia.....	150,995	231,878	163,614	136,089	116,286
Illinois.....	11,250	11,700	7,133	4,400	4,400
Indiana.....	19,706	7,596	6,472	9,048	13,102
Indian Territory..	21,577	30,483	12,402	25,072	10,693
Kansas.....	29,116	33,296	19,906	18,640	15,660
Kentucky.....	22,191	68,281	72,563	97,350	51,566
Missouri.....	9,240	10,000	10,949	9,735	3,563
Montana.....	125,655	258,523	311,013	239,560	165,187
New Mexico.....	10,025	10,925	0	18,476	28,213
New York.....	0	0	0	35,925	-----
Ohio.....	218,090	76,901	112,907	43,671	90,875
Pennsylvania.....	16,333,674	12,679,826	15,015,336	9,468,036	6,585,489
Tennessee.....	684,116	701,803	724,106	491,523	480,124
Utah.....	37,196	35,778	(b)	(b)	(b)
Virginia.....	278,724	265,107	322,486	282,898	295,747
Washington.....	46,696	42,000	50,446	34,207	18,249
West Virginia.....	1,524,746	1,845,043	1,821,965	1,716,907	1,639,687
Wisconsin.....	143,612	192,804	185,900	95,851	19,465
Wyoming.....	0	8,046	0	10,206	15,232
Total.....	23,215,302	20,393,216	23,536,141	16,523,714	12,328,856

a Includes value of Utah coke.

b Included with Colorado.

Total value at the ovens of the coke made in the United States from 1880 to 1899, inclusive, by States and Territories—Continued.

State or Territory.	1895.	1896.	1897.	1898.	1899.
Alabama	\$3,033,521	\$3,064,960	\$3,094,461	\$3,378,946	\$3,634,471
Colorado	<i>a</i> 940,987	<i>a</i> 1,046,306	<i>a</i> 999,216	<i>a</i> 1,230,428	<i>a</i> 1,333,769
Georgia	70,580	68,486	42,240	77,230	116,917
Illinois	4,500	5,200	2,895	4,686	} 5,565
Indiana	9,333	8,647	5,795	3,194	
Indian Territory ..	17,657	73,574	104,725	96,639	71,965
Kansas	11,289	8,676	9,272	6,455	30,817
Kentucky	37,249	42,062	45,454	32,213	161,454
Massachusetts					(<i>b</i>)
Missouri	2,442	4,131	3,890	1,050	5,520
Montana	189,856	425,483	467,481	359,174	356,190
New Mexico	29,491	48,453	3,232	14,625	99,217
New York		(<i>b</i>)	(<i>b</i>)	(<i>b</i>)	(<i>b</i>)
Ohio	69,655	208,789	235,784	211,558	255,129
Pennsylvania	11,908,162	<i>c</i> 13,182,859	<i>c</i> 13,727,966	<i>c</i> 16,078,505	<i>d</i> 22,881,910
Tennessee	754,926	624,011	667,656	642,920	850,686
Utah	(<i>e</i>)	(<i>e</i>)	(<i>e</i>)	(<i>e</i>)	(<i>e</i>)
Virginia	322,564	404,573	495,864	699,781	1,071,284
Washington	64,632	104,894	115,754	128,933	151,216
West Virginia	1,724,239	2,259,999	1,933,808	2,432,657	3,480,408
Wisconsin	26,103	21,000	75,000	123,480	125,389
Wyoming	17,133	58,626	72,021	64,225	38,510
Total	19,234,319	21,660,729	22,102,514	25,586,699	34,670,417

*a*Includes value of Utah coke.

*b*Included with Pennsylvania.

*c*Includes value of New York coke.

*d*Includes Massachusetts and New York.

*e*Included with Colorado.

While this table gives the totals of the value as returned in the schedules, the figures do not always represent the same thing. A statement as to the actual selling price of the coke was asked for, and in most cases, including possibly 80 per cent of all the coke produced, the figures are the actual selling price. In some cases, however, the value is an estimate. A considerable amount of the coke made in the United States is produced by proprietors of blast furnaces for consumption in their own furnaces, none being sold. The value, therefore, given for this coke would be an estimate, based, in some instances, where there are coke works in the neighborhood selling coke for the general market, upon the price obtained for this coke; in other cases the cost is estimated at the cost of the coke at the furnace plus a small percentage for profit on the coking operation, while in still other cases the value given is only the actual cost of the coke at the ovens.

In the following table is given the average value per short ton of the coke made in the United States for each year from 1880 to 1899, inclusive, by States and Territories:

Average value per short ton of the coke made in the United States from 1880 to 1899, inclusive, by States and Territories.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Alabama	\$3.01	\$3.00	\$2.79	\$2.75	\$2.50	\$2.50	\$2.65
Colorado	5.68	5.29	4.67	4.36	3.45	3.88	3.99
Georgia	2.15	2.15	2.15	2.20	2.13	2.04	2.17
Illinois	3.30	3.10	2.55	2.10	1.96	2.68	2.65
Indiana							2.93
Indian Territory ..	3.00	3.00	3.00	3.00	3.00	3.60	3.50
Kansas	1.95	1.80	1.70	1.96	2.02	1.65	1.54
Kentucky	2.88	2.89	2.83	2.87	3.94	3.14	2.23
Missouri							
Montana					12.00	11.72	
New Mexico			6.00	5.50	5.00	5.00	5.00
Ohio	2.54	2.49	2.57	2.57	2.49	2.78	2.69
Pennsylvania	1.86	1.70	1.55	1.22	1.25	1.25	1.42
Tennessee	2.42	2.33	2.52	2.25	1.95	1.31	1.87
Utah	10.00		10.00				
Virginia				1.75	1.75	1.75	2.50
Washington					4.75	4.75	5.00
West Virginia	2.30	2.30	2.26	2.19	1.19	1.86	1.94
Wisconsin							
Average	1.99	1.88	1.77	1.49	1.49	1.49	1.63

State or Territory.	1887.	1888.	1889.	1890.	1891.	1892.
Alabama	\$2.39	\$2.34	\$2.30	\$2.41	\$2.33	\$2.31
Colorado	4.00	4.00	3.43	3.90	3.24	3.31
Georgia	2.20	2.12	1.57	1.48	2.25	2.00
Illinois	2.13	2.84	2.57	2.25	2.25	2.25
Indiana	2.81	2.68	3.12	3.28	2.00	2.02
Indian Territory ..	3.33	2.90	2.70	3.25	3.22	3.47
Kansas	1.91	1.96	1.91	2.37	2.35	2.18
Kentucky	2.18	2.04	2.28	1.80	2.02	2.01
Missouri	3.50	3.50	1.10	1.51	1.46	1.50
Montana	10.00	8.00	8.69	8.71	8.91	9.00
New Mexico	6.00	6.00	5.32	4.89	4.75	
New York						
Ohio	2.65	2.48	2.50	2.92	1.99	2.18

Average value per short ton at the ovens of the coke made in the United States from 1880 to 1899, inclusive, by States and Territories—Continued.

State or Territory.	1887.	1888.	1889.	1890.	1891.	1892.
Pennsylvania	\$1. 84	\$1. 26	\$1. 40	\$1. 91	\$1. 82	\$1. 80
Tennessee	2. 19	1. 27	2. 03	1. 96	1. 93	2. 05
Utah			4. 00	4. 36	4. 50	
Virginia	2. 50	1. 74	2. 22	1. 68	1. 58	2. 18
Washington	7. 00	0	8. 00	8. 00	7. 00	7. 03
West Virginia	2. 22	1. 70	1. 76	1. 83	1. 83	1. 76
Wisconsin		3. 00	5. 75	5. 75	5. 61	5. 50
Wyoming					3. 00	
Average	2. 01	1. 46	1. 62	2. 02	1. 97	1. 96

State or Territory.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Alabama	\$2. 27	\$2. 025	\$2. 10	\$2. 07	\$2. 14	\$2. 03	\$2. 03
Colorado	^a 3. 13	^a 2. 85	^a 2. 76	^a 2. 88	^a 2. 916	^a 2. 59	^a 2. 51
Georgia	1. 50	1. 25	1. 17	1. 276	1. 28	1. 56	2. 30
Illinois	2. 00	2. 00	2. 00	2. 00	1. 87	2. 02	} 2. 35
Indiana	1. 58	2. 00	1. 94	1. 99	1. 995	1. 75	
Indian Territory ..	3. 51	3. 50	3. 41	3. 50	3. 45	2. 833	2. 96
Kansas	2. 18	1. 855	2. 14	1. 813	1. 50	1. 544	2. 13
Kentucky	2. 00	1. 73	1. 46	1. 55	1. 41	1. 448	1. 99
Massachusetts							
Missouri	1. 65	1. 58	1. 20	1. 65	1. 50	1. 42	1. 93
Montana	8. 00	9. 50	7. 49	7. 08	6. 89	6. 906	6. 32
New Mexico	3. 18	4. 32	2. 01	2. 00	2. 25	2. 095	2. 25
New York	2. 80						
Ohio	1. 95	2. 78	2. 40	2. 58	2. 48	2. 47	3. 04
Pennsylvania	1. 52	1. 086	1. 266	^b 1. 792	^b 1. 53	^b 1. 50	^b 1. 69
Tennessee	1. 85	1. 64	1. 90	1. 84	1. 81	1. 63	1. 95
Utah							
Virginia	2. 26	1. 64	1. 32	1. 509	1. 40	1. 317	1. 73
Washington	5. 08	3. 48	4. 27	4. 04	4. 42	4. 27	4. 98
West Virginia	1. 62	1. 373	1. 34	1. 37	1. 31	1. 26	1. 53
Wisconsin	6. 41	4. 58	5. 25	3. 94	4. 36	3. 50	3. 75
Wyoming	3. 50	3. 50	3. 50	3. 00	3. 00	3. 50	2. 46
Average	1. 74	1. 34	1. 44	1. 837	1. 663	1. 594	1. 76

^a Average value, including Utah.

^b Average value, including New York, and in 1899 Massachusetts also.

[illegible]

Rank of the States and Territories in production of coke from 1880 to 1899—Continued.

State or Territory.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Pennsylvania	1	1	1	1	1	1	1	1	1	1
West Virginia	3	3	3	3	2	3	2	2	2	2
Alabama	2	2	2	2	3	2	3	3	3	3
Virginia	6	6	6	6	6	6	6	5	4	4
Colorado	5	5	4	4	4	5	4	6	5	5
Tennessee	4	4	5	5	5	4	5	4	6	6
Massachusetts										7
Ohio	8	8	8	10	8	8	7	7	7	8
Kentucky	11	10	9	8	9	9	10	10	15	9
Montana	10	11	10	9	10	10	8	8	8	10
Georgia	7	7	7	7	7	7	9	9	9	11
New Mexico	19	20		18	15	14	12	21	17	12
Wisconsin	9	9	11	12	18	17	17	16	10	13
Washington	17	16	15	16	16	13	11	13	12	14
New York				13	11	12	16	12	14	15
Utah	13	14	13	11	12	11	14	15	13	16
Indian Territory ..	14	13	16	15	19	16	13	11	11	17
Wyoming		19		20	17	18	15	14	16	18
Kansas	12	12	12	14	13	15	18	17	18	19
Missouri	15	15	14	17	20	21	21	19	21	20
Indiana	16	18	17	19	14	19	19	18	20	21
Illinois	18	17	18	21	21	20	20	20	19	22
Texas						22	22	22		

It will be seen from this table that the six leading States held in 1899 the same relative positions as in 1898. Massachusetts, appearing for the first time, takes seventh place; Kentucky advances from fifteenth to ninth, and New Mexico from seventeenth to twelfth; Indian Territory drops from eleventh to seventeenth. These are the only important changes.

COAL CONSUMED IN THE MANUFACTURE OF COKE.

In the following table is given the total number of tons of coal used in the manufacture of coke in the United States for the years 1880 to 1899:

Amount of coal used in the manufacture of coke in the United States from 1880 to 1899, inclusive, by States and Territories.

[Short tons.]

State or Territory.	1880.	1881.	1882.	1883.	1884.
Alabama	106,283	184,881	261,839	359,699	413,184
Colorado	51,891	97,508	180,549	224,089	181,968
Georgia	63,402	68,960	77,670	111,687	132,113
Illinois	31,240	35,240	25,270	31,370	30,168
Indian Territory ..	2,494	2,852	3,266	4,150	3,084
Kansas	4,800	8,800	9,200	18,400	11,500
Kentucky	7,206	7,406	6,006	8,437	3,451
Montana					165
New Mexico			1,500	6,941	29,990
Ohio	172,453	201,145	181,577	152,502	108,164
Pennsylvania	4,347,558	5,393,503	6,149,179	6,823,275	6,204,604
Tennessee	217,656	241,644	313,537	330,961	348,295
Utah	2,000		500		
Virginia				39,000	99,000
Washington					700
West Virginia	230,758	304,823	366,653	411,159	385,588
Total	5,237,741	6,546,762	7,577,646	8,516,670	7,951,974

State or Territory.	1885.	1886.	1887.	1888.	1889.
Alabama	507,934	635,120	550,047	858,608	1,746,277
Colorado	208,069	228,060	267,487	274,212	299,731
Georgia	117,781	136,133	158,482	140,000	157,878
Illinois	21,487	17,806	16,596	13,020	19,250
Indiana		13,030	35,600	26,547	16,428
Indian Territory ..	5,781	10,242	20,121	13,126	13,277
Kansas	15,000	23,062	27,604	24,934	21,600
Kentucky	5,075	9,055	29,129	42,642	25,129
Missouri			5,400	5,000	8,485
Montana	300		10,800	20,000	30,576
New Mexico	31,889	18,194	22,549	14,628	7,162
Ohio	68,796	59,332	164,974	124,201	132,828
Pennsylvania	6,178,500	8,290,849	8,938,438	9,673,097	11,581,292
Tennessee	412,538	621,669	665,857	630,099	626,016

COKE.

545

Amount of coal used in the manufacture of coke in the United States from 1880 to 1899, inclusive, by States and Territories—Continued.

[Short tons.]

State or Territory.	1885.	1886.	1887.	1888.	1889.
Utah					2,217
Virginia	81,899	200,018	235,841	230,529	238,793
Washington	544	1,400	22,500		6,983
West Virginia.....	415,533	425,002	698,327	863,707	1,001,372
Wisconsin				1,000	25,616
Total	8,071,126	10,688,972	11,859,752	12,945,350	15,960,973
State or Territory.	1890.	1891.	1892.	1893.	1894.
Alabama	1,809,964	2,144,277	2,585,966	2,015,398	1,574,245
Colorado	407,023	452,749	^a 599,200	^a 628,935	^a 542,429
Georgia	170,388	164,875	158,978	171,645	166,523
Illinois	9,000	10,000	4,800	3,300	3,800
Indiana	11,753	8,688	6,456	11,549	13,489
Indian Territory ..	13,278	20,551	7,138	15,118	7,274
Kansas	21,809	27,181	15,437	13,645	13,288
Kentucky	24,372	64,390	70,783	97,212	66,418
Missouri.....	9,491	10,377	11,088	8,875	3,442
Montana	32,148	61,667	64,412	61,770	33,313
New Mexico	3,980	4,000	0	14,698	13,042
New York				15,150	
Ohio	126,921	69,320	95,236	42,963	55,324
Pennsylvania	13,046,143	10,588,544	12,591,345	9,386,702	9,059,118
Tennessee	600,387	623,177	600,126	449,511	516,802
Utah	24,058	25,281			
Virginia	251,683	285,113	226,517	194,059	280,524
Washington	9,120	10,000	12,372	11,374	8,563
West Virginia.....	1,395,266	1,716,976	1,709,183	1,745,757	1,976,128
Wisconsin	38,425	52,904	54,300	24,085	6,343
Wyoming		4,470	0	5,400	8,685
Total	18,005,209	16,344,540	18,813,337	14,917,146	14,348,750

^aIncludes coal consumed in Utah.

Amount of coal used in the manufacture of coke in the United States from 1880 to 1899, inclusive, by States and Territories—Continued.

[Short tons.]

State or Territory.	1895.	1896.	1897.	1898.	1899.
Alabama	2, 459, 465	2, 573, 713	2, 451, 475	2, 814, 615	3, 028, 472
Colorado	<i>a</i> 580, 584	<i>a</i> 639, 238	<i>a</i> 616, 592	<i>a</i> 603, 686	<i>a</i> 898, 207
Georgia	118, 900	109, 655	67, 000	81, 108	78, 098
Illinois	3, 600	3, 900	3, 591	6, 650	4, 217
Indiana	9, 898	8, 956	7, 022	4, 065	
Indian Territory ..	11, 825	53, 028	68, 495	73, 330	50, 255
Kansas	8, 424	8, 940	11, 772	7, 856	26, 988
Kentucky	63, 419	55, 719	64, 234	44, 484	151, 503
Massachusetts.....				(<i>b</i>)	(<i>b</i>)
Missouri.....	3, 120	4, 471	4, 627	1, 500	5, 320
Montana	55, 770	113, 165	139, 907	92, 552	110, 274
New Mexico	22, 385	39, 286	2, 585	12, 557	68, 594
New York.....	22, 207	(<i>b</i>)	(<i>b</i>)	(<i>b</i>)	(<i>b</i>)
Ohio	51, 921	128, 923	151, 545	134, 757	142, 678
Pennsylvania	14, 211, 567	<i>c</i> 11, 124, 610	<i>c</i> 13, 538, 646	<i>c</i> 16, 307, 841	<i>d</i> 19, 930, 419
Tennessee	684, 655	600, 379	667, 996	722, 356	779, 995
Texas	530	0	700	0	0
Utah		(<i>e</i>)	(<i>e</i>)	(<i>e</i>)	(<i>e</i>)
Virginia	410, 737	454, 964	574, 542	852, 972	994, 635
Washington	22, 973	38, 685	39, 124	48, 559	50, 813
West Virginia.....	2, 087, 816	2, 687, 104	2, 413, 283	3, 145, 398	3, 802, 825
Wisconsin	8, 287	8, 648	29, 207	59, 900	54, 950
Wyoming	10, 240	41, 038	54, 976	35, 384	32, 100
Total.....	20, 848, 323	18, 694, 422	20, 907, 319	25, 249, 570	30, 219, 343

a Includes coal consumed in Utah.

b Included with Pennsylvania.

c Includes New York.

d Includes Massachusetts and New York.

e Included with Colorado.

In regard to this table, it is well to repeat what has been stated in some of the previous reports. In the first place, it is to be noted that in many cases the statement as to the amount of coal used in the production of coke is an estimate. At but few works is the coal weighed before being charged into the ovens. A great deal of the coke made in the United States is from run of mine—that is, all of the product of mining, lump, nut, and slack, as it comes to the mouth of the pit in the mine car, is charged into the ovens—and if no coal is sold as coal it is comparatively easy to ascertain from the amounts paid for mining what is the amount of coal charged into the ovens. But even in such cases considerable difficulty arises, from the fact that mining is paid for by the measured bushel or ton of so many cubic feet, while our statistics

are by weight, and the measured bushel or ton is often not the equivalent of the weighed bushel or ton. It is also true that in certain districts where the men are paid by the car the car contains, even of measured tons, more than the men are paid for. Under such circumstances it is not to the interest of the operator to weigh the coal as it is charged into the oven.

Further, in many districts coke making is simply for the purpose of utilizing the slack coal produced in mining or that which falls through the screen at the tipple when lump is sold. In such cases the slack is rarely, if ever, weighed, as it is charged into the ovens, so that any statement as to the amount of coal used at such works will be an estimate. At some works the coal is often weighed for a brief period, and, the coke being weighed as it is sold, a percentage of yield is ascertained which is used in statements as to the amount of coal used and the yield of this coal in coke.

It is to be observed, however, that producers, particularly of the larger class where system and order are maintained, are each year keeping more accurate account of the coal charged into the ovens and of the coke obtained from it, whether used by themselves or marketed. For this reason the figures of the last few years are obtained from more exact data, but the comparatively slight changes shown in the next two tables indicate that the estimates made for earlier years were quite close.

Attention is here called to what appears to be a marked discrepancy between the figures contained in the above table and those shown in the chapter on the production of coal. In the coal report the amount of coal made into coke in the United States in 1899 is given as 27,247,826 short tons, nearly 3,000,000 tons less than that shown in the above table. In explanation of this it may be stated that this difference is in coal which is not made into coke at the mines, but it is shipped to ovens at a distance, much of it being sold as coal, and is therefore included in the statement of shipments. For instance, the coal report shows no coal made into coke in Illinois, Kansas, Missouri, or Wisconsin. In the last State mentioned coal is not even mined, the coke being made from coal purchased in Pennsylvania. In some cases the coal report shows a larger amount of coal made into coke than the coke report does. In this case the difference is due to the washing of the coal before coking, the weight of the coal before washing being reported in the one case and the washed coal in the other case. In some of the less important States the figures are identical in both reports.

The amount of coal necessary to produce a ton of coke, assuming that the above tables are approximately correct, was as follows:

Coal required to produce a ton of coke, in tons or pounds.

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1880.....	1.57	3,140	1890.....	1.56	3,120
1881.....	1.59	3,180	1891.....	1.58	3,160
1882.....	1.58	3,160	1892.....	1.57	3,140
1883.....	1.56	3,120	1893.....	1.57	3,140
1884.....	1.63	3,260	1894.....	1.56	3,120
1885.....	1.58	3,160	1895.....	1.56	3,120
1886.....	1.56	3,120	1896.....	1.58½	3,170
1887.....	1.56	3,120	1897.....	1.57	3,140
1888.....	1.51	3,020	1898.....	1.57	3,140
1889.....	1.55	3,100	1899.....	1.54	3,080

The following table exhibits the percentage yield of coal in the manufacture of coke for the years 1880 to 1899, inclusive. By the "yield" is meant the percentage of the constituents of the coal that remains as coke after the process of coking. The table shows that the general average for most of the years given is about 64 per cent, but it is believed that even this is a little too high. It is not possible to acquire exact information on this point, for the reason that in many instances the coal is not weighed before being charged into the ovens. As stated in regard to the table showing the amount of coal made into coke, the percentage yield, like the amount, is largely estimated. Probably the actual yield of coke throughout the United States, if the actual weight of the coal charged into the ovens and the actual weight of the coke drawn had been taken, would not have exceeded 60 or 61 per cent.

Percentage yield of coal in the manufacture of coke in the United States from 1880 to 1899, inclusive, by States and Territories.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Alabama	57	59	58	60	60	59	59	59	60	59
Colorado	49	50	57	60	64	63	62.6	64	65.6	63
Georgia	60	60	60	60	60	60	60	50	60	60
Illinois	41	42	45	43	43	48	46	55.5	56.9	60
Indiana	0	0	0	0	0	0	47	50	45	51
Indian Territory.	62	62	62	62	62	62	62	50	57	50
Kansas	64	64.4	65	62.9	62.3	53.7	54.2	54	59	64
Kentucky	60	60	59	60	64	53	50	50	54	52
Missouri	0	0	0	0	0	0	0	55	52	62
Montana	0	0	0	0	46	58.5	0	66.7	60	46
New Mexico	0	0	66.7	57.3	57.5	56.3	56	61	58	48
Ohio	58	59	57	58	58	57	59	56	54	56
Pennsylvania	65	64	64	65	62	64.6	65.2	65.3	68	66
Tennessee	60	60	60	62	63	53	59	61	61	57
Texas	0	0	0	0	0	0	50	0	0	0
Utah	50	0	50	0	0	0	0	0	0	34
Virginia	0	0	0	64.5	64.3	60	61.1	70.8	64.7	61
Washington	0	0	0	0	57.5	57	58.9	65	0	55
West Virginia	60	61	63	63	62	63	62	63.3	61.6	61
Wisconsin	0	0	0	0	0	0	0	0	50	62.5
Wyoming	0	0	0	0	0	0	0	0	0	0
Total average.	63	63	63	64	61	63	64	64.2	66	64

State or Territory.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Alabama	59	60	58	50	58.7	58.7	57.5	58.8	59	59
Colorado	60	61	63.9	57.7	58.5	58.6	56.9	55.6	59.1	59
Georgia	60	62.5	51.5	52.8	55.9	50.6	49	49.3	61	65.2
Illinois	55	52	66	66.7	57.9	62.5	66.7	43	35	56.2
Indiana	51	44	49.7	49.6	48.6	48.5	49	41.4	44.9	
Indian Territory.	50	46	50	47	42	43.8	40	44.3	46.5	41
Kansas	56	52	59.2	62.8	63.5	62.8	53.5	52.5	53	53.6
Kentucky	51	52	51	50	44.8	40.1	48.6	50	50	53.5
Massachusetts										
Missouri	65	66	65.8	66.5	65.4	65	55.9	56	49.3	53.8
Montana	45	47	53.6	48.5	52.2	45.4	53	48.5	56	51
New Mexico	51.5	57.5	0	39.5	50	65.5	61.7	55.6	55.6	64.3
New York				84.8		83.4				

Percentage yield of coal in the manufacture of coke in the United States from 1880 to 1899, inclusive, by States and Territories—Continued.

State or Territory.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Ohio	59	56	54.4	52	59	56	62.7	62.7	63.5	58.8
Pennsylvania	65	66	66.1	66	66.9	66.2	66.1	66.2	65.7	68.1
Tennessee	58	58	59	59	56.6	57.9	56.5	55	54.6	55.8
Texas	0	0	0	0	0	54	0	56.3	0	0
Utah	35	31								
Virginia	66	58.8	65.3	64.5	64.2	59.6	58.9	61.6	62	62.2
Washington	64	60	58	59	61.2	65.9	67	67	62.2	59.8
West Virginia	59	58.8	60.5	60.8	60.4	61.6	61.4	61	61.2	60
Wisconsin	65	65	62.2	62	67	60	62	59	59	60.8
Wyoming	0	60	0	54	50	47.8	47.6	43.7	51.9	48.7
Total average.	64	63	64	63.5	64	64	63	63.5	63.6	65.1

a Average, including Utah.

b Average, including New York, also Massachusetts for 1899.

AMOUNT AND VALUE OF COAL USED IN COKE MAKING.

The amount and value of coal used in making coke during the last three years, by States, together with the amount and value of coal used per ton of coke made, are shown in the following table. The value of the coal used in 1899 was \$18,290,453 and the value of the coke made from it, as shown in a preceding table, was \$34,670,417. The amount of coal used was 30,219,343 tons, yielding 19,668,569 tons of coke. The loss of weight by coking was 35 per cent; the increase in value of the coke over the value of the coal was 89.5 per cent. About one-fourth of the coal used in coke making is slack coal, which has little or no value at the mine. In late years there has been a considerable increase in the percentage of washed coal, particularly the slack, used. This improves the quality of the resultant coke and increases the yield from the coal charged into the ovens, but it also increases the expense of the coking operations and must be taken into account when considering the difference between the value of the coal used and that of the coke made.

Amount and value of coal used in the manufacture of coke in the United States in 1899, and amount and value of same per ton of coke.

State or Territory.	Coal used.	Total value of coal.	Value of coal per ton.	Amount of coal per ton of coke.	Value of coal to a ton of coke.
	<i>Short tons.</i>			<i>Short tons.</i>	
Alabama	3,028,472	\$2,596,718	\$0.857	1.69	\$1.45
Colorado (a)	898,207	544,772	.607	1.69	1.03
Georgia	78,098	62,893	.805	1.53	1.24
Illinois	4,217	2,520	.598	1.78	1.06
Indiana					
Indian Territory ..	59,255	29,396	.496	2.43	1.21
Kansas	26,988	26,079	.97	1.86	1.80
Kentucky	151,503	72,196	.477	1.87	.89
Missouri	5,320	2,256	.424	1.86	.79
Montana	110,274	189,232	1.716	1.96	3.36
New Mexico	68,594	35,229	.514	1.55	.80
Ohio	142,678	102,540	.719	1.70	1.22
Pennsylvania (b) ..	19,930,419	11,514,614	.578	1.47	.85
Tennessee	779,995	530,774	.68	1.79	1.22
Virginia	994,635	523,979	.53	1.61	.85
Washington	50,813	79,770	1.57	1.67	2.63
West Virginia	3,802,825	1,869,110	.49	1.67	.82
Wisconsin	54,950	93,415	1.70	1.64	2.79
Wyoming	32,100	14,960	.466	2.05	.96
Total and averages	30,219,343	18,290,453	.605	1.54	.93

^a Figures given for Colorado include the statistics of Utah.

^b Figures for Pennsylvania include the statistics of New York and Massachusetts.

Amount and value of coal used in the manufacture of coke in the United States in 1898, and amount and value of same per ton of coke.

State or Territory.	Coal used.	Total value of coal.	Value of coal per ton.	Amount of coal per ton of coke.	Value of coal to a ton of coke.
	<i>Short tons.</i>			<i>Short tons.</i>	
Alabama	2,814,615	\$2,142,210	\$0.76	1.69	\$1.28
Colorado (a)	803,686	548,038	.68	1.69	1.15
Georgia	81,108	40,554	.50	1.637	.82
Illinois	6,650	1,662	.25	2.86	.715
Indiana	4,065	1,423	.35	2.23	.78
Indian Territory..	73,330	51,908	.708	2.15	1.52
Kansas	7,856	4,015	.51	1.88	.96
Kentucky	44,484	6,235	.14	2.00	.28
Missouri	1,500	650	.433	2.03	.88
Montana	92,552	253,011	2.73	1.78	4.86
New Mexico	12,557	6,279	.50	1.80	.90
Ohio	134,757	127,924	.95	1.575	1.50
Pennsylvania (b) ..	16,307,841	10,346,448	.634	1.52	.96
Tennessee	722,356	418,598	.58	1.83	1.06
Virginia	852,972	495,539	.58	1.606	.93
Washington	48,559	89,155	1.836	1.61	2.956
West Virginia	3,145,398	1,619,575	.51	1.634	.84
Wisconsin	59,900	88,850	1.483	1.70	2.52
Wyoming	35,384	17,692	.50	1.93	.965
Total and averages	25,249,570	16,259,766	.644	1.573	1.013

a Figures given for Colorado include the statistics of Utah.

b Figures given for Pennsylvania include the statistics of New York.

COKE.

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Amount and value of coal used in the manufacture of coke in the United States in 1897, and amount and value of same per ton of coke.

State or Territory.	Coal used.	Total value of coal.	Value of coal per ton.	Amount of coal per ton of coke.	Value of coal to a ton of coke.
	<i>Short tons.</i>			<i>Short tons.</i>	
Alabama	2,451,475	\$2,047,975	\$0.83½	1.70	\$1.42
Colorado (a).....	616,592	441,450	.716	1.80	1.29
Georgia	67,000	33,500	.50	2.03	1.02
Illinois	3,591	1,436	.40	2.32	.93
Indiana	7,022	3,511	.50	2.49	1.25
Indian Territory..	68,495	57,581	.84	2.25	1.89
Kansas	11,772	5,886	.50	1.90	.95
Kentucky	64,234	12,621	.20	2.00	.40
Missouri.....	4,627	2,698	.583	1.78	1.04
Montana	139,907	301,046	2.15	2.06	4.43
New Mexico.....	2,585	2,282	.88	1.80	1.58
Ohio	151,545	141,197	.93	1.59	1.48
Pennsylvania (b)..	13,538,646	7,825,569	.578	1.51	.87
Tennessee	667,996	525,755	.787	1.81	1.42
Texas	700			1.78	
Virginia.....	574,542	315,986	.55	1.62	.89
Washington	39,124	77,377	1.98	1.49	2.95
West Virginia	2,413,283	1,290,468	.53	1.64	.87
Wisconsin	29,207	55,000	1.88	1.70	3.20
Wyoming	54,976	43,980	.80	2.29	1.83
Total and averages.....	20,907,319	13,185,318	.63	1.57	.99

a Figures given for Colorado include the statistics of Utah.

b Figures given for Pennsylvania include the statistics of New York.

CONDITION IN WHICH COAL IS CHARGED INTO OVENS.

In the following table will be found a statement of the condition of coal when charged into ovens—that is, whether it is run of mine, slack, washed, or unwashed. The tables for 1899, 1898, and 1897, are given. The headings explain themselves. It is only necessary to state that run of mine, washed, includes that run-of-mine coal which is crushed before being washed.

Character of coal used in the manufacture of coke in 1899.

State or Territory.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Alabama	1,656,226	725,238	9,898	637,110	3,028,472
Colorado (a)	125,322	0	468,196	304,689	898,207
Georgia	0	48,521	0	29,577	78,098
Illinois	300	0	404	3,513	4,217
Indiana					
Indian Territory ..	0	0	0	59,255	59,255
Kansas	0	6,210	20,778	0	26,988
Kentucky	21,600	0	30,263	99,640	151,503
Massachusetts					
Missouri	0	0	5,320	0	5,320
Montana	0	0	0	110,274	110,274
New Mexico	0	0	68,594	0	68,594
New York					
Ohio	88,771	0	23,907	30,000	142,678
Pennsylvania (b) ..	16,854,706	366,206	1,824,784	884,723	19,930,419
Tennessee	140,804	267,105	31,850	340,236	779,995
Utah					
Virginia	612,267	0	225,118	157,250	994,635
Washington	0	44,681	0	6,132	50,813
West Virginia	1,336,239	0	2,215,255	251,331	3,802,825
Wisconsin	34,680	0	20,270	0	54,950
Wyoming	0	0	32,100	0	32,100
Total	20,870,915	1,457,961	4,976,737	2,913,730	30,219,343

a Includes Utah.

b Includes Massachusetts and New York.

Character of coal used in the manufacture of coke in 1898.

State or Territory.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Alabama	1,290,794	828,294	25,000	670,527	2,814,615
Colorado (a)	122,983	0	415,298	265,405	803,686
Georgia	0	61,844	0	19,264	81,108
Illinois	0	0	0	6,650	6,650
Indiana	0	0	0	4,065	4,065
Indian Territory ..	0	15,353	0	57,977	73,330
Kansas	0	0	7,856	0	7,856
Kentucky	0	1,800	0	42,684	44,484
Missouri	0	0	1,500	0	1,500
Montana	12,000	60,000	0	20,552	92,552
New Mexico	0	0	12,557	0	12,557
New York					
Ohio	92,963	0	19,794	22,000	134,757
Pennsylvania (b) ..	14,063,073	350,153	1,472,347	402,268	16,307,841
Tennessee	37,217	306,969	122,756	255,414	722,356
Virginia	405,399	0	237,474	210,099	852,972
Washington	0	48,559	0	0	48,559
West Virginia	713,815	0	2,137,983	293,600	3,145,398
Wisconsin	0	0	0	59,900	59,900
Wyoming	0	0	35,384	0	35,384
Total	16,758,244	1,672,972	4,487,949	2,330,405	25,249,570

a Includes Utah's consumption of coal.

b Includes coal coked in New York.

Character of coal used in the manufacture of coke in 1897.

State or Territory.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
Alabama	902,310	120,420	91,200	1,337,545	2,451,475
Colorado (a)	0	0	393,214	223,378	616,592
Georgia	0	67,000	0	0	67,000
Illinois	0	0	3,591	0	3,591
Indiana	0	0	0	7,022	7,022
Indian Territory ..	0	6,923	0	61,572	68,495
Kansas	0	0	11,772	0	11,772
Kentucky	4,176	0	0	60,058	64,234
Missouri	0	0	4,627	0	4,627
Montana	0	75,000	0	64,907	139,907
New Mexico	0	0	2,585	0	2,585
Ohio	92,192	0	29,353	30,000	151,545
Pennsylvania (b) ..	11,540,459	301,052	1,441,611	255,524	13,538,646
Tennessee	36,485	400,166	119,755	111,590	667,996
Texas	0	0	0	700	700
Virginia	286,158	0	227,363	61,021	574,542
Washington	0	39,124	0	0	39,124
West Virginia	373,205	28,145	1,800,528	211,405	2,413,283
Wisconsin	0	0	0	29,207	29,207
Wyoming	0	0	54,976	0	54,976
Total	13,234,985	1,037,830	4,180,575	2,453,929	20,907,319

a Includes Utah's consumption of coal.

b Includes coal coked in New York.

In the following table the statistics regarding the character of the coal for the years 1890 to 1899, inclusive, are consolidated:

Character of coal used in the manufacture of coke in the United States since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890	14,060,907	338,563	2,674,492	931,247	18,005,209
1891	12,255,415	290,807	2,945,359	852,959	16,344,540
1892	14,453,638	324,050	3,256,493	779,156	18,813,337
1893	10,306,082	350,112	3,049,075	1,211,877	14,917,146
1894	9,648,750	405,266	3,102,652	1,192,082	14,348,750
1895	15,609,875	237,468	3,052,246	1,948,734	20,848,323
1896	11,307,905	763,244	4,685,832	1,937,441	18,694,422
1897	13,234,985	1,037,830	4,180,575	2,453,929	20,907,319
1898	16,758,244	1,672,972	4,487,949	2,330,405	25,249,570
1899	20,870,915	1,457,961	4,976,737	2,913,730	30,219,343

IMPORTS AND EXPORTS.

The following table gives the quantities and value of coke imported and entered for consumption in the United States from 1869 to 1899, inclusive. In the reports of the Treasury Department the quantities given are long tons. These have been reduced to short tons to make the tables consistent with the other tables in this report:

Coke imported und entered for consumption in the United States, 1869 to 1899, inclusive.

Year ending June 30—	Quantity.	Value.	Year ending Dec. 31—	Quantity.	Value.
	<i>Short tons.</i>			<i>Short tons.</i>	
1869.....		\$2, 053	1886.....	28, 124	\$84, 801
1870.....		6, 388	1887.....	35, 320	100, 312
1871.....		19, 528	1888.....	35, 201	107, 914
1872.....	9, 575	9, 217	1889.....	28, 608	88, 008
1873.....	1, 091	1, 366	1890.....	20, 808	101, 767
1874.....	634	4, 588	1891.....	50, 753	223, 184
1875.....	1, 046	9, 648	1892.....	27, 420	86, 350
1876.....	2, 065	8, 657	1893.....	37, 183	99, 683
1877.....	4, 068	16, 686	1894.....	32, 566	70, 359
1878.....	6, 616	24, 186	1895.....	29, 622	71, 366
1879.....	6, 035	24, 748	1896.....	43, 372	114, 713
1880.....	5, 047	18, 406	1897.....	34, 937	98, 077
1881.....	15, 210	64, 987	1898.....	46, 127	142, 334
1882.....	14, 924	53, 244	1899.....	31, 197	142, 504
1883.....	20, 634	113, 114			
1884.....	14, 483	36, 278			
1885.....	20, 876	64, 814			

The amount and value of coke exported from the United States since 1895 are shown in the following table:

Coke exported from the United States since 1895.

Year.	Quantity.	Value.
	<i>Short tons.</i>	
1895.....	131, 368	\$425, 174
1896.....	169, 189	553, 600
1897.....	173, 034	546, 066
1898.....	199, 562	600, 931
1899.....	280, 196	858, 856

BY-PRODUCT COKE MAKING IN 1899.

The amount of coke made in by-product ovens in 1899 was more than three times as large as that of the preceding year, and, as shown in the following table, the number of completed ovens was nearly double. The reason for this large increase in production, as compared with the increase in the number of completed ovens, lies in the fact that the 240 ovens reported as under construction at the close of 1897 and in operation during 1898 were not put in blast until late in 1898, and consequently did not add materially to the production, whereas, the new ovens finished in 1899 were completed early in the year, and their product, as well as those completed in the latter part of 1898, helped to swell the new production in 1899. The new plants were fully described in the report for 1898.

Reduced to tabular form, the record of by-product coke making in the United States since 1893, when the first plant was constructed, at Syracuse, has been as follows:

Record of by-product coke making since 1893.

Year.	Ovens.		Product. <i>Short tons.</i>
	Built.	Building.	
1893.....	12	0	12, 850
1894.....	12	60	18, 500
1895.....	<i>a</i> 72	60	18, 521
1896.....	160	120	83, 038
1897.....	280	240	261, 912
1898.....	<i>b</i> 520	<i>c</i> 500	294, 445
1899.....	<i>d</i> 1, 020	<i>e</i> 65	906, 534

a Sixty of these ovens did not begin making coke until 1896.

b Includes 280 Semet-Solvay, 180 Otto-Hoffman, and 60 Newton-Chambers.

c All Otto-Hoffman.

d Includes 280 Semet-Solvay, 690 Otto-Hoffman, and 60 Newton-Chambers.

e Semet-Solvay.

The foregoing statement regarding the number of ovens includes for 1899 only those actually in existence or building at the close of the year. The ovens built include the plants at the following places:

Semet-Solvay ovens.—Syracuse, New York, 25 ovens; Dunbar, Pennsylvania, 50 ovens; Sharon, Pennsylvania, 25 ovens; Ensley, Alabama, 120 ovens, and Wheeling, West Virginia, 60 ovens. Total, 280.

Otto-Hoffman ovens.—Johnstown, Pennsylvania, 160 ovens; Otto, near Pittsburg, Pennsylvania, 120 ovens; Everett, Massachusetts, 400 ovens. Total, 680.

Newton-Chambers ovens.—Pocahontas, Virginia, 60 ovens.

All of the ovens building at the close of 1899 were Semet-Solvay ovens—5 at Syracuse, New York, and 60 at Wheeling, West Virginia; but since the statistics for 1899 were completed there has been a considerable activity in the building of by-product ovens. The Solvay Process Company is building at its works in Detroit, Michigan, 30 Semet-Solvay ovens, and these ovens will be in operation during 1901.

Since the close of 1899, 50 Otto-Hoffman ovens have been constructed at Hamilton, Ohio, and there are at present in course of construction of the Otto-Hoffman ovens—at Buffalo, New York, 564; at Lebanon, Pennsylvania, 232, and at Camden, New Jersey, 100; so that there are now in existence or under construction a total of 2,061 by-product ovens. This doubles the number in existence at the close of 1899 and is nearly four times the number in existence in 1898. These statistics do not include the 400 Otto-Hoffman ovens erected at Sidney, Nova Scotia, for the Dominion Iron and Steel Company of that city, as these ovens are not within the United States. Of the plants in existence or in course of construction, the ones at Everett, Massachusetts; Hamilton, Ohio; and Camden, New Jersey, are constructed with the idea of making gas the primary product. They are manufacturing or will manufacture an illuminating gas of 18 to 20 candlepower, and a number of other plants of this class are reported as under consideration. The daily capacity of one of these ovens varies from 5 to 6 short tons of coal.

The percentages of products from by-product ovens vary about as follows: Coke, 73 to 87 per cent; tar, 1.8 to 5.5 per cent; sulphate of ammonia, 0.8 to 1.3 per cent. The surplus gas varies considerably, according to the volatile contents of the coal carbonized, the maximum being about 5,000 cubic feet per short ton. This gas has a calorific value up to 700 B. H. U., and the gas produced at Everett, Massachusetts, has at times even exceeded this figure. The gas produced is usually the same in composition as the illuminating gas made in gas-house retorts, as follows:

Composition of coke-oven gas, Otto-Hoffman system, at Everett, Massachusetts.

Constituent.	Percentage.
Carbon dioxide	1.3
Illuminants.....	3.4
Oxygen .....	.45
Carbon monoxide	6.
Methane.....	33.5
Hydrogen	50.45
Nitrogen.....	4.9
Total	100.

The total quantity of gas obtained is about 10,000 cubic feet per ton of coal, varying, as before stated, according to whether the coal is high or low in volatile matter. It is customary to use about 6,500 cubic feet for heating the ovens; the balance is used for various purposes, either as fuel or for illuminating.

In the foregoing statement no account is taken of the 30 Newton-Chambers ovens constructed at Latrobe, Pennsylvania, in 1896, and which have not been operated as by-product ovens, nor of 3 experimental Slocum ovens at Bolivar, which have never been operated at all.

In connection with the statistics of the production of coke in by-product ovens, it is pertinent to consider the disposition of the gas, tar, and ammonia recovered in the process. According to the reports made jointly to the Census Office and the Geological Survey, the total value of the by-products recovered in the manufacture of coke in retort ovens in 1899 amounted to \$944,537. These were distributed as follows:

Amount and value of gas, tar, and ammonia recovered in by-product coke making in 1899.

By-product.	Amount.	Value.
Tar.....pounds..	104, 687, 330	\$207, 952
Ammonia liquor.....gallons..	1, 572, 325	180, 642
Ammonium sulphate.....pounds..	11, 984, 931	330, 921
Surplus gas.....cubic feet..	1, 996, 124, 697	225, 022
Total.....		944, 537

The continued success of the by-product coke-making establishments already in existence, and the extension of this system of coke manufacture, necessarily depends upon the ability of the producers to secure profitable markets for the by-products. There is at the present time sufficient demand for the gas and ammonia products to eliminate those factors from the problem. The market for the surplus gas (i. e., the gas not required for the generation of the heat in the oven flues) is determined by the location of each plant. Most of the by-product ovens constructed in the United States have coke for the primary product, with gas as one of the by-products. In such cases no attempt is made to produce an illuminating gas, and this by-product is sold for fuel purposes. The Semet-Solvay plants at Wheeling, West Virginia; Sharon and Dunbar, Pennsylvania, and Ensley, Alabama, are located near iron or steel works, and the gas as well as the coke is consumed in these works. The gas from the Otto-Hoffman ovens, at Otto, near Pittsburg, Pennsylvania, and at Johnstown; and from the Semet-Solvay ovens at Syracuse, is also used for fuel, the coke in each case being the primary product. The Otto-Hoffman

plant at Everett, Massachusetts, which makes gas its primary product, has its ready market in the city of Boston. Since the close of 1899 a bank of 50 Otto-Hoffman ovens has been completed at Hamilton, Ohio, which makes gas the primary product, and another plant of 100 ovens of the same type now building at Camden, New Jersey, will also make gas of illuminating quality the principal product. The markets for the gas product are assured in advance.

The United Coke and Gas Company, operating the Otto-Hoffman ovens, has adopted a method of fractionally separating the gases of distillation at those plants where gas is the principal product, as at Everett, Massachusetts, and Hamilton, Ohio. By this process a gas of high illuminating power is obtained. In order to maintain a uniform high candle power in the gas and to allow a sufficient flexibility to follow the varying demand in a city's gas consumption an auxiliary producer plant is employed, by means of which more coke-oven gas becomes available. This gas is necessarily of lower candle power, to correct which and maintain a gas of uniform illuminating quality the illuminants (chiefly benzole) are removed from the poorer gas burned in the oven flues and transferred to the gas sent into the city mains.

There is also a steady and remunerative demand for the ammonia, and the production of large quantities of ammonia from the various coking plants has had no material influence on the market price.

Ammonia is obtained in the form of a weak liquor containing ammonium sulphide and ammonium carbonate. It is concentrated into a crude, impure liquor containing from 20 to 25 per cent NH_3 , 40 to 45 grams per liter of H_2S , and from 100 to 120 grams per liter of CO_2 . Some of this liquor is sold as ammonia liquor and some is worked up into various ammonium compounds, such as ammonium chloride, ammonium carbonate, ammonium sulphate, aqua ammonia, and anhydrous ammonia.

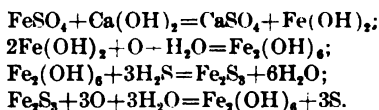
At some works all the liquor is worked up into ammonium sulphate and sold as such.

Considerable quantities of ammonium chloride and carbonate are imported into the United States, the former being used for galvanizing and electrical purposes and the latter in the manufacture of baking powders, etc. With a regular supply of these compounds from domestic sources, which will be provided by the extension of the use of by-product ovens, a decrease in the importations may be anticipated. Aqua and anhydrous ammonia are used extensively for refrigerating purposes. Recent discoveries have shown that potassium cyanide, largely used in the treatment of certain classes of gold ores, can be profitably made from ammonia. Any excess of production will be readily taken, though at lower prices, for fertilizing purposes.

Another important by-product, a constituent of the gas, and thus far not yet recovered, is cyanogen. It is an impurity in the gas and may

be removed by the use of an alkaline iron salt. The cyanogen is formed into a ferrocyanide of potassium or sodium in solution; the solution is evaporated to the crystallizing point and the crystals then purified. The amount of cyanogen obtained varies according to the amount of volatile matter in the coal and the percentage of nitrogen and the temperature to which the ovens are heated, high temperature tending to increase the cyanogen in the gas.

The method of preparing potassium ferrocyanide by heating animal matter, potassium carbonate and iron is still used in three German and some English and American works; but in Europe the main source of supply is coal gas. When a mixture of calcium hydroxide and iron sulphate is used to remove the hydrogen sulphide, the following reactions take place:



During this process the cyanogen compounds are also absorbed by the ferric hydroxide, and, after the mass has become useless on account of the accumulation of sulphur, they are isolated in the following manner: The mass, which contains sulphide of iron, sulphur, salts of lime and free lime, ferrocyanides, and sulphocyanides of iron and ammonia, is treated with water to remove the soluble part, and the residue, after treatment with lime to form the calcium ferrocyanide, is converted, by the action of potassium chloride, into an insoluble compound of potassium and calcium ferrocyanide, which is decomposed by potassium carbonate with the formation of potassium ferrocyanide. In one English factory the gas is passed through a solution of an iron salt and the prussian blue formed is decomposed by caustic potash. In one factory in Germany the "vinasses" are heated, and the cyanogen compounds formed from the decomposition of the trimethylamine are converted into prussian blue as in the other method. In 1899 the production of potassium ferrocyanide in France, Germany, England, Belgium, Holland, and the United States amounted to 10,500 tons, of which 50 per cent was converted into potassium cyanide. Potassium sulphocyanide, which is also obtained from the coal gas, is also made in comparatively small quantity and is converted into a copper salt, which is used as a constituent of paint for the hulls of vessels. This copper salt acts as a poison to the crustacea which foul the hulls of ships.¹

The most urgent demand in connection with by-product coke making is the building up in the United States of chemical manufacturing establishments, based upon coal tar as a raw material for the manufacture of colors, dyes, and other articles now obtained solely from foreign sources. At present the principal use to which coal tar is put in the United States is the manufacture of roofing paper, the creosoting of lumber, and for street paving. As shown in the preceding table, the amount of tar produced at by-product coke ovens in the United States during 1899 was 104,687,330 pounds, valued at \$207,952. The extent to which this material is manufactured may be briefly summarized as follows:

¹ Am. Chem. Jour., Vol. XXIV, No. 6, pp. 530-531.

The tar is distilled, yielding (1) light oil, (2) heavy oil, and (3) pitch. The points of distillation are for light oils up to 220°C . Oils distilled above this point sink into the water, and are classed among heavy oils, which are distilled at temperatures from 220°C . to 295° or 300°C ., according to the quality of the pitch required.

According to the practice in the United States, a portion of the light oil is again distilled for the benzol and toluene contained. These in turn are nitrified and sold as nitro-benzol, or oil of myrbane, which is converted into aniline and aniline salts. But a very small portion of the light oils are so used.

By a further distillation of the oils and pitch a series of valuable products are obtainable, but so far as the industry in this country is concerned there is very little utilized. The continued distillation of the tar will produce the following:

Tar ...	Light oil....	{ Benzol ... Toluene .. Xylene... }	Nitro-benzol, aniline, aniline salts, oil of myrbane.
	Heavy oil...	{ Phenol ... Cresol.... Pyridine . }	
	Pitch.....	Anthracene, alizarine.	

The extension of the use of by-product coke ovens in the United States and the regular supply of the coal tar as a raw material in the manufacture of aniline colors, salts, etc., should be followed by the establishment of the chemical industries for the manufacture of these valuable products which are now imported to the value of several millions of dollars annually.

The Bureau of Statistics of the Treasury Department reports that there were imported in the United States during the fiscal year ending June 30, 1900, \$6,773,152 worth of coal-tar products. Upon these duty was paid to the amount of \$1,516,689, making a total cost at the port of entry exclusive of freight charges of \$8,289,741. There has been almost uninterrupted increase in the importation of these coal-tar products during the last five years. In 1896 the value of the coal-tar products imported in the United States amounted to \$4,713,200, upon which duty to the amount of \$729,583 was paid—a total cost at the port of entry of \$5,442,783, showing that the increase in the value of these products in the five years is something over 50 per cent.

In the following table is shown the imports of the coal-tar products for each year from 1896 to 1900, the figures being for the fiscal year ending June 30:

Coal-tar products imported into the United States during the fiscal years 1896 to 1900.

1896.

Article.	Amount.	Value.	Duty.
	<i>Pounds.</i>		
Salicylic	335, 354	\$138, 013	Free.
Alizarine and colors or dyes, natural and artificial.....	6, 154, 156	994, 395	Free.
Aniline salts		682, 459	Free.
Coal-tar colors or dyes, n. s. p. f.		2, 918, 333	\$729, 583
Coal tar, all preparations, not colors or dyes			
Coal-tar products, not medicinal, not dyes, known as benzol, toluol, etc			
Total.....		4, 713, 200	729, 583

1897.

Article.	Amount.	Value.	Duty.
	<i>Pounds.</i>		
Salicylic	616, 187	\$201, 980	Free.
Alizarine and colors or dyes, natural and artificial.....	6, 169, 018	1, 023, 425	Free.
Aniline salts		812, 884	Free.
Coal-tar colors or dyes, n. s. p. f.		3, 163, 182	\$790, 796
Coal tar, all preparations, not colors or dyes			
Coal-tar products, not medicinal, not dyes, known as benzol, toluol, etc			
Total.....		5, 201, 471	790, 796

Coal-tar products imported into the United States during the fiscal years 1896 to 1900—Continued.

1898.

Article.	Amount.	Value.	Duty.
	<i>Pounds.</i>		
Salicylic	92, 943	\$28, 688	\$6, 794
Alizarine and colors or dyes, natural and artificial.....	5, 871, 962	886, 349	Free.
Aniline salts		1, 087, 704	Free.
Coal-tar colors or dyes, n. s. p. f.....		3, 723, 288	1, 098, 532
Coal tar, all preparations, not colors or dyes.....		134, 416	26, 883
Coal-tar products, not medicinal, not dyes, known as benzol, toluol, etc		228, 037	Free.
Total.....		6, 088, 482	1, 132, 209

1899.

Article.	Amount.	Value.	Duty.
	<i>Pounds.</i>		
Salicylic	185, 359	\$57, 192	\$18, 536
Alizarine and colors or dyes, natural and artificial.....	5, 226, 452	700, 786	Free.
Aniline salts	7, 930, 172	743, 130	Free.
Coal-tar colors or dyes, n. s. p. f.....		3, 900, 099	1, 170, 030
Coal tar, all preparations not colors or dyes.....		221, 101	44, 220
Coal-tar products not medicinal, not dyes, known as benzol, toluol, etc		393, 602	Free.
Total.....		6, 015, 910	1, 232, 786

Coal-tar products imported into the United States during the fiscal years 1896 to 1900—Continued.

1900.

Article.	Amount.	Value.	Duty.
	<i>Pounds.</i>		
Salicylic	240,687	\$89,175	\$24,069
Alizarine and colors or dyes, natural and artificial	6,009,552	771,336	Free.
Aniline salts	7,522,819	537,812	Free.
Coal-tar colors or dyes, n. s. p. f.		4,792,103	1,437,631
Coal tar, all preparations not colors or dyes		274,946	54,989
Coal-tar products not medicinal, not dyes, known as benzol, toluol, etc		307,780	Free.
Total		6,773,152	1,516,689

The countries shipping these products to the United States are Germany, England, and France. The greater portion comes from Germany. It is claimed that the reason Germany is better able to manufacture the colors and other coal-tar products than the United States is on account of her large supply of chemical labor, the chemists in that country being satisfied to work for a lower compensation than the American chemists. Against this may be set the cheaper coal, and consequently cheaper tar as a raw material than it is possible to obtain in any of the European countries. It is claimed, also, that the coals of the United States will yield a larger percentage of by-products per ton of coal carbonized, and the higher price of chemical labor and skilled labor in the United States is more than offset by the ability of the American manufacturer to replace with machinery the hand labor of Europe. The other raw materials which are used in the color works—such as sulphuric, nitric, and hydrochloric acids, carbonate of soda and caustic of soda—are all as cheap in this country as in Europe. Many of the patents previously existing and which protected the manufacturers of the coal-tar colors have expired, and the processes are free to anyone engaging in the industry. Among the colors which are now produced in foreign countries and imported in large quantities into the United States may be mentioned the following:

I. Aniline dyes:

- (a) Rosaniline group, in which class are magenta, or fuchsine, malachite green, aniline blue, methyl green, and others.

I. Aniline dyes—Continued.

- (b) Indulines and safranines.
- (c) Oxazines.
- (d) Aniline black.

II. Phenol dyes:

- (a) Nitro bodies, chief of which is picric acid.
- (b) Coloring matters which are formed by the action of nitrous acid on the phenols; for example, fluorescent resorcin blue.
- (c) Rosolic acid, yellow, and red corallin.
- (d) Phthaleins and indophenols. Under this heading are phenolphthalein, fluorescein, and the various eosins, which are used in large quantities.

III. Azo dyes:

- (a) Amido azo, crysoidine aniline yellow.
- (b) Amidoazosulphonic acids, helianthine, tropaeoline, etc.
- (c) Oxyazo dyes; among these are the most important dyes of the coal-tar colors.

IV. Artificial indigo.**V. Anthracene dyes, such as alizarine, purpurin, flavopurpurin.**

The writer is under many obligations to Dr. F. Schniewind, of the United Gas and Coke Company, and to Mr. J. D. Pennock, chemist for the Solvay Process Company, for notes on the present and future condition of the by-product ovens and the utilization of the by-products, which are summarized in the foregoing discussion.

PRODUCTION OF COKE BY STATES.**ALABAMA.**

The coke production of Alabama in 1899 amounted to 1,787,809 short tons, valued at \$3,634,471, against 1,663,020 tons, valued at \$3,378,946, in 1898, indicating a gain of 124,789 tons, or 7.5 per cent, in amount, and of \$255,525, or 7.6 per cent, in value. The increase in Alabama was not equal either in amount or percentage to the increase shown in West Virginia, and the latter State seems now to have become as firmly established in second place in coke production as it is in third place among the coal-producing States. The coke product of Alabama in 1899, while the largest in the history of the State, was nearly 500,000 tons short of that of West Virginia. The number of completed ovens in West Virginia in 1899 was over 50 per cent larger than that of Alabama, but there were 850 ovens building at the close of the year in Alabama to 619 in West Virginia. The indications are that the manufacture of coke in Alabama will continue to increase, but it is not likely that the lead taken by West Virginia will be overcome.

Alabama was one of the few States in which the average price in 1899 was not more than that of 1898, the production and value showing practically the same percentage of increase.

The total number of ovens in operation during 1899 was 5,056, in addition to which there were 543 idle all the year, making a total for the State of 5,599, against 5,456 in 1898, of which 386 were idle. There were 130 ovens abandoned during the year, from which it appears that 273 new ovens were constructed during 1899.

The coal fields of Alabama are divided into three subdistricts, known as the Warrior, the Coosa, and the Cahaba, these districts being named from the rivers which drain them. Coke ovens are built in all three districts, but coke has been made for the last four years in but two—the Warrior and the Cahaba. The most important of these districts, both as a coal producer and coke maker, is the Warrior, the ovens in this district being located near Birmingham.

Of the 5,599 ovens in the State, 5,132 are in the Warrior district, and of the total production of 1,787,809 tons in 1899, 1,712,035 tons were made in the Warrior district.

While most of the ovens built in the State are of the ordinary beehive pattern—the more recent ones being of the usual dimensions, 12 feet in diameter and 7 feet high—it is evident from the frequent attempts that have been made to introduce other ovens that the beehive oven as a coker of Alabama coal is not entirely satisfactory. The ovens other than beehive, which had up to 1898 been introduced successfully into Alabama, are solid-wall ovens, or ovens in which there are no flues in the walls, and in which the coking chamber or combustion chamber, wherein the heat for coking is produced, are the same. Two forms of these modified solid-wall ovens are in use in Alabama at the present time, one known as the "Thomas" oven, which has already been described in this series of reports, and the other as the "double oblong." These ovens are 21 feet long and 9 feet wide, open at both ends. The ovens are charged from the top and drawn at the ends. They produce in a given time about 75 per cent more coke than the ordinary beehive oven. The most recent and most important departure from the beehive type of ovens has been the completion of a bank of 120 Semet-Solvay ovens at Ensley, which were put into operation in December, 1898. The buildings were destroyed by fire a few days afterwards, but were immediately rebuilt and, by February, 1899, operations were resumed. The plant has been in active operation ever since; the coke and surplus gas are consumed by the Ensley furnaces of the Tennessee Coal, Iron, and Railroad Company.

The statistics of coke production in Alabama since 1880 are as follows:

Statistics of the manufacture of coke in Alabama from 1880 to 1899, inclusive.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
1880..	4	316	100	106, 283	60, 781	\$183, 063	\$3. 01	57
1881..	4	416	120	184, 881	109, 033	326, 819	3. 00	59
1882..	5	536	-----	261, 839	152, 940	425, 940	2. 79	58
1883..	6	767	122	359, 699	217, 531	598, 473	2. 75	60
1884..	8	<i>a</i> 976	242	413, 184	244, 009	609, 185	2. 50	60
1885..	11	1, 075	16	507, 934	301, 180	755, 645	2. 50	59
1886..	14	<i>a</i> 1, 301	1, 012	635, 120	375, 054	993, 302	2. 65	59
1887..	15	1, 555	1, 362	550, 047	325, 020	775, 090	2. 39	59
1888..	18	2, 475	406	848, 608	508, 511	1, 189, 579	2. 34	60
1889..	19	3, 944	427	1, 746, 277	1, 030, 510	2, 372, 417	2. 30	59
1890..	20	4, 805	371	1, 809, 964	1, 072, 942	2, 589, 447	2. 41	59
1891..	21	5, 068	50	2, 144, 277	1, 282, 496	2, 986, 242	2. 33	60
1892..	20	5, 320	90	2, 585, 966	1, 501, 571	3, 464, 623	2. 31	58
1893..	23	5, 548	60	2, 015, 398	1, 168, 085	2, 648, 632	2. 27	58
1894..	22	5, 551	50	1, 574, 245	923, 817	1, 871, 348	2. 025	58. 7
1895..	22	5, 658	50	2, 459, 465	1, 444, 339	3, 033, 521	2. 10	58. 7
1896..	24	5, 363	-----	2, 573, 713	1, 479, 437	3, 064, 960	2. 07	57. 5
1897..	25	5, 365	<i>b</i> 120	2, 451, 475	1, 443, 017	3, 094, 461	2. 14	58. 8
1898..	25	<i>c</i> 5, 456	100	2, 814, 615	1, 663, 020	3, 378, 946	2. 03	59
1899..	25	<i>c</i> 5, 599	850	3, 028, 472	1, 787, 809	3, 634, 471	2. 03	59

a One establishment made coke on the ground.

b Semet-Solvay ovens.

c Includes 120 Semet-Solvay ovens.

The character of the coal used in the manufacture of coke in Alabama since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Alabama since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	1,480,669	0	206,106	123,189	1,809,964
1891.....	1,943,469	0	192,238	8,570	2,144,277
1892.....	2,463,366	0	11,100	111,500	2,585,966
1893.....	1,246,307	51,163	292,198	425,730	2,015,398
1894.....	411,097	7,429	477,820	677,899	1,574,245
1895.....	1,208,020	0	32,068	1,219,377	2,459,465
1896.....	1,292,191	70,125	51,674	1,159,723	2,573,713
1897.....	902,310	120,420	91,200	1,337,545	2,451,475
1898.....	1,290,794	828,294	25,000	670,527	2,814,615
1899.....	1,656,226	725,238	9,898	637,110	3,028,472

As shown in the above table, practically 50 per cent of the coal used in making coke in Alabama during the last four years has been washed before being charged into the ovens. Experience has shown that the coke product from some of the Alabama coal is much improved by washing the coal. Not only is the percentage of ash and sulphur reduced, but the physical structure of the coke is improved. From 1890 to 1892 washing the coal was done in an experimental manner. The next three years showed a rapid increase in the amount of washed coal used, and now about half the coal charged into the ovens is washed.

COLORADO.

Colorado is by far the most important coke-producing State west of the Mississippi River, and stands fifth among all the States in this regard. The total amount of coke produced by the States west of the Mississippi River in 1899 was 714,850 short tons, of which Colorado produced 530,424 tons, or practically 75 per cent. Compared with 1898, the coke production of Colorado in 1899 increased 55,616 short tons, or 11.7 per cent, with an increase in value of \$103,341, or a little over 8 per cent. The average price declined slightly from \$2.59 per ton in 1898 to \$2.51 in 1899. The statistics for 1899 show no increase in the number of coke-making establishments and a reduction of 10 in the number of completed ovens. There were 18 ovens idle in 1899 against 33 in 1898.

The statistics of the production of coke in Colorado from 1880 to 1899 are given in the following table. From 1892 to 1899, both inclusive, the statements of production of coke in Utah are included in Colorado:

Statistics of the manufacture of coke in Colorado from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880..	1	200	50	51,891	25,568	\$145,226	\$5.68	49
1881..	2	267	0	97,508	48,587	267,156	5.29	50
1882..	5	344	0	180,549	102,105	476,665	4.67	57
1883..	7	352	0	224,089	133,997	584,578	4.36	60
1884..	8	409	24	181,968	115,719	409,930	3.45	64
1885..	7	434	0	208,069	131,960	512,162	3.88	63
1886..	7	483	0	228,060	142,797	569,120	3.99	62.6
1887..	7	532	0	267,487	170,698	682,778	4.00	64
1888..	7	602	100	274,212	179,682	716,305	4.00	65.6
1889..	9	834	50	299,731	187,638	643,479	3.43	63
1890..	8	916	30	407,023	245,756	959,246	3.90	60
1891..	7	948	21	452,749	277,074	896,984	3.24	61
1892 ^a	9	1,128	220	599,200	373,229	1,234,320	3.31	62.3
1893 ^a	8	1,154	200	628,935	362,986	1,137,488	3.13	57.7
1894 ^a	8	1,154	250	542,429	317,196	903,970	2.85	58.5
1895 ^a	9	1,169	0	580,584	340,357	940,987	2.76	58.6
1896 ^a	11	1,275	0	639,238	363,760	1,046,306	2.88	56.9
1897 ^a	12	1,273	0	616,592	342,653	999,216	2.916	55.6
1898 ^a	12	1,253	3	803,686	474,808	1,230,428	2.59	59.8
1899 ^a	12	1,243	50	898,207	530,424	1,333,769	2.51	59

^a Includes production and value of coke in Utah, and of coal coked.

^b Includes 36 gas retorts since 1892.

Washing the slack coal before coking has been found to improve the quality and value of the resultant coke, and the amount of washed coal used has steadily increased since washeries were introduced in 1895. Light demand for coke in 1897 caused all of the product to be made from slack coal. Improved conditions in 1898 made it necessary to resume using mine-run coal.

The character of the coal used in the manufacture of coke in Colorado and Utah since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Colorado and Utah since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	36,058	0	395,023	0	431,081
1891.....	93,752	0	384,278	0	478,030
1892.....	82,098	0	517,102	0	599,200
1893.....	109,915	0	519,020	0	628,935
1894.....	126,642	0	415,787	0	542,429
1895.....	119,868	0	453,597	7,119	580,584
1896.....	143,604	0	378,776	116,858	639,238
1897.....	0	0	393,214	223,378	616,592
1898.....	122,983	0	415,298	265,405	803,686
1899.....	125,322	0	468,196	304,689	898,207

GEORGIA.

Coke production in Georgia seems to have taken on a new lease of life, revived probably by the increased demand and higher prices in 1899. The revival is not so much shown in the statistics of production, as the output in 1899 was less than 1,400 tons, or not quite 3 per cent, more than that of 1898, but is indicated by an additional 100 new ovens building at the close of the year. Of the 350 ovens in existence in 1899, 150 were idle. This is the first time in sixteen years that any new ovens have been reported as building. The actual production in 1899 was a little less than half the product in either 1890 or 1891.

The coal from which Georgia's coke is made is mined in the north-western corner of the State on the eastern border of the Appalachian coal field. The coal is all washed before being coked, but the weight of the coal used is the weight before being washed.

Although the coke product in 1899 showed an increase of less than 3 per cent over the preceding year, the value was augmented by \$39,687, or a little more than 50 per cent, the aggregate value received being the largest since 1893, when the product exceeded by 80 per cent the output for 1899.

The statistics of the production of coke in Georgia, 1880 to 1899, are as follows:

Statistics of the manufacture of coke in Georgia, 1880 to 1899.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	1	140	40	63,402	38,041	\$81,789	\$2. 15	60
1881.....	1	180	40	68,960	41,376	88,753	2. 15	60
1882.....	1	220	44	77,670	46,602	100,194	2. 15	60
1883.....	1	264	36	111,687	67,012	147,166	2. 20	60
1884.....	1	300	0	132,113	79,268	169,192	2. 13	60
1885.....	2	300	0	117,781	70,669	144,198	2. 04	60
1886.....	2	300	0	136,133	82,680	179,031	2. 17	60
1887.....	2	300	0	158,482	79,241	174,410	2. 20	50
1888.....	1	290	0	140,000	83,721	177,907	2. 12	60
1889.....	1	300	0	157,878	94,727	149,059	1. 57	60
1890.....	1	300	0	170,388	102,233	150,995	1. 48	60
1891.....	1	300	0	164,875	103,057	231,878	2. 25	62. 5
1892.....	1	300	0	158,978	81,807	163,614	2. 00	51. 5
1893.....	1	338	0	171,645	90,726	136,089	1. 50	52. 8
1894.....	1	338	0	166,523	93,029	116,286	1. 25	55. 9
1895.....	1	330	0	118,900	60,212	70,580	1. 17	50. 6
1896.....	1	334	0	109,655	53,673	68,486	1. 276	49
1897.....	1	300	0	67,000	33,000	42,240	1. 28	49. 3
1898.....	2	350	0	81,108	49,529	77,230	1. 56	61
1899.....	2	350	100	78,098	50,907	116,917	2. 30	65. 2

As shown in the following table, all of the coal used in the manufacture of coke in Georgia since 1891 was washed before being coked.

Character of coal used in the manufacture of coke in Georgia since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	0	0	170,388	170,388
1891.....	106,131	0	0	58,744	164,875
1892.....	0	0	0	158,978	158,978
1893.....	0	0	0	171,645	171,645
1894.....	0	166,523	0	0	166,523
1895.....	0	118,900	0	0	118,900
1896.....	0	109,655	0	0	109,655
1897.....	0	67,000	0	0	67,000
1898.....	0	61,844	0	19,264	81,108
1899.....	0	48,521	0	29,577	78,098

ILLINOIS.

The production of coke from Illinois coal continues to be insignificant. Laboratory tests have shown that some of the Illinois coals are true coking coals, but their coking qualities vary greatly, and their successful use upon a large scale has not been demonstrated. The impurities in Illinois coals have worked against it in the manufacture of metallurgical coke, and as New River and Pennsylvania cokes can be obtained at reasonable cost in the markets that would be fed by the Illinois product, consumers find it economy to use the superior article.

Of the 3 establishments and 130 ovens in the State in 1899 2 establishments having 126 ovens were idle during the entire year, and the statistics of the production at the one active plant of 4 ovens has been included with those of Indiana. There were 26 new ovens building by the Universal Fuel Company, of Chicago, at the close of the year. These ovens will be operated under the Hemingway patents, by which many of the dry noncoking coals of the interior States, and even some lignites, are said to have been successfully coked.

COKE.

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Statistics of the manufacture of coke in Illinois since 1880.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens. per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	6	176	0	31,240	12,700	\$41,950	\$3.30	41
1881.....	6	176	0	35,240	14,800	45,850	3.10	42
1882.....	7	304	0	25,270	11,400	29,050	2.55	45
1883.....	7	316	0	31,170	13,400	28,200	2.10	43
1884.....	9	325	0	30,168	13,095	25,639	1.96	43
1885.....	9	320	0	21,487	10,350	27,798	2.68	48
1886.....	9	335	0	17,806	8,103	21,487	2.65	46
1887.....	8	278	0	16,596	9,108	19,594	2.13	55.5
1888.....	8	221	0	13,020	7,410	21,038	2.84	56.9
1889.....	4	149	0	19,250	11,583	29,764	2.57	60
1890.....	4	148	0	9,000	5,000	11,250	2.25	55
1891.....	1	25	0	10,000	5,200	11,700	2.25	52
1892.....	1	24	0	4,800	3,170	7,133	2.25	66
1893.....	1	24	0	3,300	2,200	4,400	2.00	66.7
1894.....	1	24	0	3,800	2,200	4,400	2.00	57.9
1895.....	3	129	0	3,600	2,250	4,500	2.00	62.5
1896.....	3	127	0	3,900	2,600	5,200	2.00	66.7
1897.....	2	126	0	3,591	1,549	2,895	1.87	43
1898.....	2	126	0	6,650	2,325	4,686	2.02	35
1899.....	3	130	26	(a)	(a)	(a)	-----	-----

a Included with Indiana

The character of the coal used in the manufacture of coke in Illinois since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Illinois since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	Short tons.	Short tons.	Short tons.	Short tons.
1890.....	0	0	0	9,000	9,000
1891.....	0	0	10,000	0	10,000
1892.....	0	0	4,800	0	4,800
1893.....	0	0	0	3,300	3,300
1894.....	0	0	0	3,800	3,800
1895.....	0	0	0	3,600	3,600
1896.....	0	0	0	3,900	3,900
1897.....	0	0	3,591	0	3,591
1898.....	0	0	0	6,650	6,650
1899 ^a					

^aIncluded with Indiana.

INDIANA.

Conditions very similar to those which have discouraged coke making in Illinois prevail in Indiana. Good coking coals exist in the State, but the product obtained is not equal to that of Connellsville, New River, or Pocahontas, any of which can be purchased at very little difference in cost, and consumers prefer to pay the slightly higher prices for the Pennsylvania and West Virginia cokes. There are only two banks of ovens in the State, and only one of these produced coke in 1897, 1898, and 1899. The production of Indiana in 1898 was the smallest on record and the culmination of five years of steadily decreasing output. An apparent increase is shown in the production for 1899, due to the inclusion of the production of Illinois.

The statistics of the manufacture of coke in Indiana from 1886 to 1899, both inclusive, are given in the following table:

Statistics of the manufacture of coke in Indiana from 1886 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1886.....	4	100	18	13,030	6,124	\$17,953	\$2.93	47
1887.....	4	119	0	35,600	17,658	51,141	2.81	50
1888.....	3	103	0	26,547	11,956	31,993	2.68	45
1889.....	4	111	0	16,428	8,301	25,922	3.12	51
1890.....	4	101	0	11,753	6,013	19,706	3.28	51
1891.....	2	84	0	8,688	3,798	7,596	2.00	44
1892.....	2	84	0	6,456	3,207	6,472	2.02	49.7
1893.....	2	94	0	11,549	5,724	9,048	1.58	49.6
1894.....	2	94	0	13,489	6,551	13,102	2.00	48.6
1895.....	2	94	0	9,898	4,804	9,333	1.94	48.5
1896.....	2	94	0	8,956	4,353	8,647	1.99	49
1897.....	2	94	0	7,022	2,904	5,795	1.995	41.4
1898.....	2	94	0	4,065	1,825	3,194	1.75	44.9
1899.....	2	52	0	(a)4,217	(a)2,370	(a)5,565	2.35	56.2

^a Includes Illinois.

All of the coal made into coke in Indiana is slack, and since 1895 all of this has been washed, as shown in the following table:

Character of coal used in the manufacture of coke in Indiana since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	0	0	11,753	11,753
1891.....	0	0	0	8,688	8,688
1892.....	0	0	0	6,456	6,456
1893.....	0	0	930	10,619	11,549
1894.....	0	0	8,689	4,800	13,489
1895.....	0	0	0	9,898	9,898
1896.....	0	0	0	8,956	8,956
1897.....	0	0	0	7,022	7,022
1898.....	0	0	0	4,065	4,065
1899 (a).....	300	0	404	3,513	4,217

^a Includes Illinois.

INDIAN TERRITORY.

The production of coke in the Indian Territory in 1899 was 9,771 short tons less than in 1898, the output decreasing from 34,110 tons to 24,339 tons. The decrease may be attributed to the augmented demand for Territory coal, induced partly by the generally improved trade conditions and partly by the strikes in the Arkansas coal mines which curtailed the production in that State. The Territory operators had all they could do to fill their coal orders, and there was no mine-run coal, available for coke making. Only slack coal, an otherwise waste product, was used, the result of which is shown in the decrease in the percentage yield of coal in coke. All of the coal used in coking is washed before being charged into the ovens.

The 100 ovens reported as building in December, 1899, were completed in 1900, and an increased coke production in the future may be anticipated. The new ovens were built at Howe by the Mexican Gulf Coal and Transportation Company.

The statistics of the manufacture of coke in the Indian Territory from 1880 to 1899 are as follows:

Statistics of the manufacture of coke in the Indian Territory from 1880 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	1	20	0	2,494	1,546	\$4,638	\$3.00	62
1881.....	1	20	0	2,852	1,768	5,304	3.00	62
1882.....	1	20	0	3,266	2,025	6,075	3.00	62
1883.....	1	20	0	4,150	2,573	7,719	3.00	62
1884.....	1	20	0	3,084	1,912	5,736	3.00	62
1885.....	1	40	0	5,781	3,584	12,902	3.60	62
1886.....	1	40	0	10,242	6,351	22,229	3.30	62
1887.....	1	80	0	20,121	10,060	33,435	3.33	50
1888.....	1	80	0	13,126	7,502	21,755	2.90	57
1889.....		80	0	13,277	6,639	17,957	2.70	50
1890.....	1	80	0	13,278	6,639	21,577	3.25	50
1891.....	1	80	0	20,551	9,464	30,483	3.22	46
1892.....	1	80	0	7,138	3,569	12,402	3.47	50
1893.....	1	80	0	15,118	7,135	25,072	3.51	47
1894.....	1	80	0	7,274	3,051	10,693	3.50	42
1895.....	1	80	0	11,825	5,175	17,657	3.41	43.8
1896.....	2	130	0	53,028	21,021	73,574	3.50	40
1897.....	2	130	0	68,495	30,364	104,725	3.45	44.3
1898.....	2	130	0	73,330	34,110	96,639	2.833	46.5
1899.....	3	130	100	59,255	24,339	71,965	2.96	41

The character of the coal used in the manufacture of coke in the Indian Territory since 1890 is shown in the following table:

(Character of coal used in the manufacture of coke in the Indian Territory since 1890.)

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	0	0	13, 278	13, 278
1891.....	0	0	9, 500	11, 051	20, 551
1892.....	0	0	0	7, 138	7, 138
1893.....	0	0	0	15, 118	15, 118
1894.....	0	0	0	7, 274	7, 274
1895.....	0	0	0	11, 825	11, 825
1896.....	0	0	0	53, 028	53, 028
1897.....	0	6, 923	0	61, 572	68, 495
1898.....	0	15, 353	0	57, 977	73, 330
1899.....	0	0	0	59, 255	59, 255

KANSAS.

The coke industry of Kansas is only of local importance, the production of coke in this State being chiefly for domestic purposes and the smelting of lead and zinc. Most of the coke produced in the State is made by the lead and zinc smelters for their own use.

As will be seen from the following table, there were 50 ovens in course of construction at the close of 1898 and 47 ovens built. Fourteen of the old ovens were abandoned in 1899. The ovens building at the close of 1898 were completed and 12 more constructed during 1899, making the total number in the State 95, twenty more than the 75 ovens reported in 1892 and 1893. Of the 95 ovens, 49 were operated and 46 idle during the year.

The statistics of the manufacture of coke in Kansas from 1880 to 1899 are as follows:

Statistics of the manufacture of coke in Kansas from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	2	6	.....	4,800	3,070	\$6,000	\$1.95	64
1881.....	3	15	.....	8,800	5,670	10,200	1.80	64.4
1882.....	3	20	.....	9,200	6,080	11,460	1.70	66
1883.....	4	23	.....	13,400	8,430	16,560	1.96	62.9
1884.....	4	23	.....	11,500	7,190	14,580	2.02	62.5
1885.....	4	23	.....	15,000	8,050	13,255	1.65	53.7
1886.....	4	36	.....	23,062	12,493	19,204	1.54	54.2
1887.....	4	39	.....	27,604	14,950	28,575	1.91	54
1888.....	6	58	.....	24,934	14,831	29,073	1.96	59.5
1889.....	6	68	.....	21,600	13,910	26,593	1.91	64
1890.....	7	68	.....	21,809	12,311	29,116	2.37	56
1891.....	6	72	.....	27,181	14,174	33,296	2.35	52
1892.....	6	75	.....	15,437	9,132	19,906	2.18	59.2
1893.....	6	75	0	13,645	8,565	18,640	2.18	62.8
1894.....	6	61	0	13,288	8,439	15,660	1.855	63.5
1895.....	5	55	0	8,424	5,287	11,289	2.14	62.8
1896.....	6	55	0	8,940	4,785	8,676	1.813	53.5
1897.....	4	57	0	11,772	6,181	9,272	1.50	52.5
1898.....	6	47	50	7,856	4,180	6,455	1.545	53
1899.....	9	95	0	26,988	14,476	30,817	2.13	53.6

The character of the coal used in the manufacture of coke in Kansas since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Kansas since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	0	19,619	2,190	21,809
1891.....	0	0	27,181	0	27,181
1892.....	0	0	15,437	0	15,437
1893.....	0	0	12,445	1,200	13,645
1894.....	0	0	13,288	0	13,288
1895.....	0	0	8,424	0	8,424
1896.....	0	0	8,940	0	8,940
1897.....	0	0	11,772	0	11,772
1898.....	0	0	7,856	0	7,856
1899.....	0	6,210	20,778	0	26,988

KENTUCKY.

Coke making can not be considered an important industry in Kentucky. It consists principally in the utilization of the slack produced at the mines in the western part of the State. The production in 1899 was the largest on record and was nearly four times the output in 1898. Nearly all of the coal used, whether run of mine or slack, is washed before coking. An experimental plant of Keneval patent ovens was constructed at Knoxville during 1899.

The statistics of the manufacture of coke in Kentucky from 1880 to 1899 are as follows:

Statistics of the manufacture of coke in Kentucky from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	5	45	.....	7, 206	4, 250	\$12, 250	\$2. 88	59
1881.....	5	45	.....	7, 406	4, 370	12, 630	2. 89	59
1882.....	5	45	.....	6, 906	4, 070	11, 530	2. 83	59
1883.....	5	45	.....	8, 437	5, 025	14, 425	2. 87	60
1884.....	5	45	.....	3, 451	2, 223	8, 760	3. 94	64
1885.....	5	33	.....	5, 075	2, 704	8, 489	3. 14	53
1886.....	6	76	2	9, 055	4, 528	10, 082	2. 23	50
1887.....	6	98	.....	29, 129	14, 565	31, 730	2. 18	50
1888.....	10	132	2	42, 642	23, 150	47, 244	2. 04	54
1889.....	9	166	100	25, 192	13, 021	29, 769	2. 28	52
1890.....	9	175	103	24, 372	12, 343	22, 191	1. 80	51
1891.....	7	115	24	64, 390	33, 777	68, 281	2. 02	52
1892.....	5	287	100	70, 783	36, 123	72, 563	2. 01	51
1893.....	4	283	100	97, 212	48, 619	97, 350	2. 00	50
1894.....	6	293	0	66, 418	29, 748	51, 566	1. 73	44. 8
1895.....	5	293	0	63, 419	25, 460	37, 249	1. 46	40. 1
1896.....	4	264	0	55, 719	27, 107	42, 062	1. 55	48. 6
1897.....	5	268	0	64, 234	32, 117	45, 454	1. 41	50
1898.....	5	292	2	44, 484	22, 242	32, 213	1. 448	50
1899.....	6	300	130	151, 503	81, 095	161, 454	1. 99	53. 5

The character of the coal used in the manufacture of coke in Kentucky since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Kentucky since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	3,000	2,100	19,272	24,372
1891.....	11,000	0	3,500	49,890	64,390
1892.....	0	5,955	7,883	56,945	70,783
1893.....	825	11,973	26,759	57,655	97,212
1894.....	0	2,980	7,900	55,538	66,418
1895.....	0	502	624	62,293	63,419
1896.....	16,271	0	0	39,448	55,719
1897.....	4,176	0	0	60,058	64,234
1898.....	0	1,800	0	42,684	44,484
1899.....	21,600	0	30,263	99,640	151,503

MASSACHUSETTS.

The plant of Otto-Hoffman ovens at Everett was fully described in this report for 1898. The coal from which the coke is made is drawn from Nova Scotia mines. This being the only plant in the State, the statistics of production are included with Pennsylvania.

MISSOURI.

Missouri coke production is insignificant. The ovens in this State, like those in Kansas, are operated by lead and zinc smelters who consume the product. There were four firms or establishments in the State in 1899, having a total of 12 ovens, one establishment of four ovens being idle all the year. The production in 1899 amounted to only 2,860 short tons, which was, however, the largest in six years, and four times that of 1898.

The statistics of the production of coke in Missouri from 1887, when coking began in this State, to 1899 are as follows:

Statistics of the manufacture of coke in Missouri from 1887 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1887.....	1	4	.....	5,400	2,970	\$10,395	\$3.50	55
1888.....	1	4	.....	5,000	2,600	9,100	3.50	52
1889.....	3	9	.....	8,485	5,275	5,800	1.10	62
1890.....	3	10	.....	9,491	6,138	9,240	1.51	65
1891.....	3	10	.....	10,377	6,872	10,000	1.45	66
1892.....	3	10	.....	11,088	7,299	10,949	1.50	65.8
1893.....	3	10	0	8,875	5,905	9,735	1.65	66.5
1894.....	3	10	0	3,442	2,250	3,563	1.58	65.4
1895.....	3	10	0	3,120	2,028	2,442	1.20	65
1896.....	3	7	0	4,471	2,500	4,131	1.65	55.9
1897.....	3	15	0	4,627	2,593	3,890	1.50	56
1898.....	3	8	0	1,500	740	1,050	1.42	49.3
1899.....	4	12	0	5,320	2,860	5,520	1.93	53.8

The character of the coal used for coke in Missouri since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Missouri since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	0	9,491	0	9,491
1891.....	0	0	10,377	0	10,377
1892.....	0	0	11,088	0	11,088
1893.....	0	0	8,875	0	8,875
1894.....	0	0	3,442	0	3,442
1895.....	0	0	3,120	0	3,120
1896.....	0	0	4,471	0	4,471
1897.....	0	0	4,627	0	4,627
1898.....	0	0	1,500	0	1,500
1899.....	0	0	5,320	0	5,320

MONTANA.

The production of coke in Montana in 1899 increased slightly over 1898, but was not equal to that of either 1896 nor 1897, while the value fell off about \$3,000. Fifteen ovens were abandoned in 1899, reducing the total number from 318 to 303, and of these 100 were not operated during the year.

The statistics of the manufacture of coke in Montana from 1883, when ovens were first reported, to 1899 are as follows:

Statistics of the manufacture of coke in Montana from 1883 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				Short tons.	Short tons.			Per cent.
1883.....	1	2	0	0	0	0	0	0
1884.....	3	5	12	165	75	\$900	\$12.00	46
1885.....	2	2	0	300	175	2,063	11.72	58.5
1886.....	4	16	0	0	0	0	0	0
1887.....	2	27	0	10,800	7,200	72,000	10.00	66.7
1888.....	1	40	0	20,000	12,000	96,000	8.00	60
1889.....	2	90	50	30,576	14,043	122,023	8.69	46
1890.....	2	140	0	32,148	14,427	125,655	8.71	45
1891.....	2	140	0	61,667	29,009	258,523	8.91	47
1892.....	2	153	0	64,412	34,557	311,013	9.00	53.6
1893.....	2	153	0	61,770	29,945	239,560	8.00	48.5
1894.....	2	153	0	33,313	17,388	165,187	9.50	52.2
1895.....	3	303	0	55,770	25,337	189,856	7.49	45.4
1896.....	3	303	0	113,165	60,078	425,483	7.08	53
1897.....	3	303	0	139,907	67,849	467,481	6.89	48.5
1898.....	4	318	0	92,552	52,009	359,174	6.91	56
1899.....	3	303	0	110,274	56,376	356,190	6.32	51

The character of the coal used in the manufacture of coke in Montana since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Montana.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	22,852	0	9,296	32,148
1891.....	0	34,000	0	27,667	61,667
1892.....	0	28,000	0	36,412	64,412
1893.....	0	44,000	0	17,770	61,770
1894.....	0	33,313	0	0	33,313
1895.....	0	0	0	55,770	55,770
1896.....	0	50,000	0	63,165	113,165
1897.....	0	75,000	0	64,907	139,907
1898.....	12,000	60,000	0	20,552	92,552
1899.....	0	0	0	110,274	110,274

NEW MEXICO.

In the report for 1898 it was stated that a considerable increase could be expected in the production of coke in New Mexico as a result of the completion of a new bank of 64 ovens at Blossburg, constructed by the Colorado Fuel and Iron Company. The returns for 1899 show a product of 44,134 short tons, more than six times that of 1898. The value of the product was nearly seven times as large in 1899 as it was in 1898, the average price advancing 15 cents per ton. The coal used for coke making in New Mexico is entirely unwashed slack. A notable increase is shown in the percentage yield of coal in coke. There were 190 ovens in existence at the close of 1899; of these 76 were idle throughout the year.

The statistics of the production of coke in New Mexico from 1882, when coke ovens were first reported, until 1899 are as follows:

Statistics of the manufacture of coke in New Mexico from 1882 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1882.....	2	0	12	1,500	1,000	\$6,000	\$6.00	66 $\frac{2}{3}$
1883.....	2	12	28	6,941	3,905	21,478	5.50	57 $\frac{1}{4}$
1884.....	2	70	0	29,990	18,282	91,410	5.00	57 $\frac{1}{4}$
1885.....	2	70	0	31,889	17,940	89,700	5.00	56 $\frac{1}{4}$
1886.....	2	70	0	18,194	10,236	51,180	5.00	56
1887.....	1	70	0	22,549	13,710	82,260	6.00	61
1888.....	1	70	0	14,628	8,540	51,240	6.00	58
1889.....	2	70	0	7,162	3,460	18,408	5.32	48
1890.....	2	70	0	3,980	2,050	10,025	4.89	51.5
1891.....	1	70	0	4,000	2,300	10,925	4.75	57.5
1892.....	1	50	0	0	0	0	0	0
1893.....	1	50	0	14,698	5,803	18,476	3.18	39.5
1894.....	1	50	0	13,042	6,529	28,213	4.32	50
1895.....	1	50	0	22,385	14,663	29,491	2.01	65.5
1896.....	1	50	0	39,286	24,228	48,453	2.00	61.7
1897.....	2	126	0	2,585	1,438	3,232	2.25	55.6
1898.....	3	190	0	12,557	6,980	14,625	2.095	55.6
1899.....	3	190	0	68,594	44,134	99,217	2.25	64.3

The character of the coal used in the manufacture of coke in New Mexico since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in New Mexico since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	3,980	0	0	0	3,980
1891.....	4,000	0	0	0	4,000
1892.....	0	0	0	0	0
1893.....	14,698	0	0	0	14,698
1894.....	0	0	13,042	0	13,042
1895.....					22,385
1896.....	0	0	39,286	0	39,286
1897.....	0	0	2,585	0	2,585
1898.....	0	0	12,557	0	12,557
1899.....	0	0	68,594	0	68,594

NEW YORK.

The production of coke at Syracuse, New York, is included in that of Pennsylvania, from whose fields the coal is drawn, as the reports of operations have been furnished the Survey with the understanding that they would not be divulged. The plant at Syracuse was being increased by 5 new ovens at the close of 1899.

Statistics of the manufacture of coke in New York.

	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Establishments	1	1	1	1	1	1	1
Ovens built	12	12	12	25	25	25	25
Ovens building.....	13	13	13	0	0	0	5
Coke produced.....tons..	12,850	16,500	18,521				
Coal used.....do.....	15,150		22,207				
Yield of coal in coke, per cent.....	84.8		83.4				

OHIO.

Notwithstanding the large consumption of coke in Ohio and the large fields of coking coals in the State, the coking industry is of slight importance. This is doubtless due to the same cause that obtains in Illinois and Indiana, the proximity of the Connellsville, New River,

and Pocahontas fields, and the cheapness with which these cokes can be procured.

In previous reports of Mineral Resources the State has been divided into two coke-producing districts, called the Ohio and the Cincinnati. This division is continued in the present chapter. Two establishments, having 175 ovens, in the Cherry Valley iron district are included in the Ohio coke district.

The coke production of the State in 1897 was the largest in fifteen years, most of the increase being in the Cincinnati district. A decrease of 2,349 tons was shown in the production of 1898, and a further decrease of 6,000 tons is observed in the production for 1899, the record made in 1897 remaining the maximum since 1882.

In the following table the statistics of the production of coke in the two districts of Ohio for the years 1880 to 1899 are consolidated:

Statistics of the manufacture of coke in Ohio from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880	15	616	25	172,453	100,596	\$255,905	\$2.54	58
1881	15	641	0	201,045	119,469	297,728	2.49	59
1882	16	647	0	181,577	103,722	266,113	2.57	57
1883	18	682	0	152,502	87,834	225,660	2.57	58
1884	19	732	0	108,164	62,709	156,294	2.49	58
1885	13	642	0	68,796	39,416	109,723	2.78	57
1886	15	560	0	59,332	34,932	94,042	2.69	59
1887	15	585	223	164,974	93,004	245,981	2.65	56
1888	15	547	12	124,201	67,194	166,330	2.48	54
1889	13	462	0	132,828	75,124	188,222	2.50	56
1890	13	443	1	126,921	74,633	218,090	2.92	59
1891	9	421	0	69,320	38,718	76,901	1.99	56
1892	10	436	0	95,236	51,818	112,907	2.18	54.4
1893	9	435	0	42,963	22,436	43,671	1.95	52
1894	8	363	0	55,324	32,640	90,875	2.78	59
1895	8	377	0	51,921	29,050	69,655	2.40	56
1896	9	431	0	128,923	80,868	208,789	2.58	62.7
1897	9	433	0	151,545	95,087	235,784	2.48	62.7
1898	10	441	0	134,757	85,535	211,558	2.47	63.5
1899	8	385	0	142,678	83,878	255,129	3.04	58.8

PRODUCTION BY DISTRICTS.

Cincinnati district.—All the coke made in this district is from the dust and screenings of the coal yards at Cincinnati and from the coal boats and barges that bring coal from the Upper Ohio, chiefly from the Pittsburg and the Kanawha regions of West Virginia. When the ovens are in operation, some run of mine and slack from Pittsburg mines is used in the North Bend block of ovens, situated on the Ohio River a short distance below Cincinnati.

The statistics of the manufacture of coke in the Cincinnati district from 1880 to 1899 are as follows:

Statistics of the manufacture of coke in the Cincinnati district, Ohio, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				Short tons.	Short tons.			Per cent.
1880.....	4	32	0	16,141	10,326	\$42,255	\$4.09	64
1881.....	4	32	0	20,607	13,237	54,439	4.11	64
1882.....	4	32	0	19,687	12,045	47,437	3.78	61
1883.....	5	57	0	33,978	20,106	65,990	3.28	59
1884.....	5	57	0	32,134	18,840	61,072	3.24	59
1885.....	5	82	0	17,480	10,962	35,873	3.27	63
1886.....	5	82	0	17,015	10,566	31,633	2.99	62.1
1887.....	5	150	20	56,723	32,894	95,754	2.91	58
1888.....	6	156	12	63,217	35,868	95,618	2.67	57
1889.....	5	146	0	75,892	45,108	120,899	2.68	59.4
1890.....	5	150	0	68,266	43,278	171,848	3.97	63
1891.....	3	130	0	13,403	9,080	31,529	3.47	67.7
1892.....	4	146	0	31,330	19,320	64,319	3.33	61.3
1893.....	3	142	0	13,700	9,000	27,000	3.00	65.7
1894.....	3	92	0	42,995	26,417	81,751	3.09	61
1895.....	3	92	0	9,628	5,657	16,971	3.00	58.8
1896.....	3	92	0	16,495	10,181	31,068	3.05	61.7
1897.....	3	92	0	40,200	23,532	67,079	2.85	59
1898.....	3	92	0	27,451	16,329	46,179	2.828	59.5
1899.....	2	92	0	34,176	20,678	69,373	3.35	60.5

Ohio district.—The district, as noted above, includes all of the ovens coking Ohio coal and the ovens at Leetonia, in Columbiana County, and in the vicinity of Steubenville and Bridgeport, which latter place is opposite Wheeling, West Virginia. It also includes 125 ovens of the Marietta Run Coal and Coke Company and 50 ovens of the Black Diamond Coal and Coke Company in the Federal Valley district.

Statistics of the manufacture of coke in the Ohio district, Ohio, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880	11	584	25	156,312	90,270	\$213,650	\$2.37	57
1881	11	609	0	180,438	106,232	243,289	2.39	59
1882	12	615	0	161,890	91,677	218,676	2.39	57
1883	13	625	0	118,524	67,728	459,670	2.36	57
1884	14	675	0	76,030	43,869	95,222	2.17	58
1885	8	560	0	51,316	28,454	73,850	2.60	55
1886	10	478	0	42,317	24,366	62,409	2.56	57.7
1887	10	435	203	108,251	60,110	150,227	2.50	55.5
1888	9	391	0	60,984	31,326	70,712	2.25	51
1889	8	316	0	56,936	30,016	67,323	2.24	52.7
1890	8	293	1	58,655	31,335	46,242	1.47	53.4
1891	6	291	0	55,917	29,638	45,372	1.53	53
1892	6	290	0	63,906	32,498	48,588	1.50	50.9
1893	6	293	0	29,263	13,436	16,671	1.24	46
1894	5	271	0	12,329	6,223	9,124	1.466	50.5
1895	5	285	0	42,293	23,393	52,684	2.25	55.3
1896	6	339	0	112,428	70,687	177,721	2.51	62.8
1897	6	341	0	111,345	71,555	168,705	2.36	64
1898	7	349	0	107,306	69,206	165,379	2.39	64.5
1899	6	293	0	108,502	63,200	185,756	2.94	58.2

The character of the coal used in the manufacture of coke in Ohio since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Ohio since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	34, 729	0	54, 473	37, 719	126, 921
1891.....	5, 200	0	64, 120	0	69, 320
1892.....	35, 334	0	32, 402	27, 500	95, 236
1893.....	0	0	24, 859	18, 104	42, 963
1894.....	0	0	14, 845	40, 479	55, 324
1895.....	28, 053	0	10, 868	13, 000	51, 921
1896.....	88, 616	0	24, 325	15, 982	128, 923
1897.....	92, 192	0	29, 353	30, 000	151, 545
1898.....	92, 963	0	19, 794	22, 000	134, 757
1899.....	88, 771	0	23, 907	30, 000	142, 678

PENNSYLVANIA.

The production of coke in Pennsylvania in 1899 amounted to 13,577,870 short tons, valued at \$22,881,910, an increase of 2,862,568 tons, or 26.7 per cent, in quantity, and of \$6,803,405, or 42.3 per cent, in value over the record for 1898, when the product was 10,715,302 tons, valued at \$16,078,505. The production in 1899 was over 50 per cent more than that of 1897.

Pennsylvania's coke product in 1899 represented 68 per cent of the total amount made in the United States, and of the total increase from 1898 to 1899 more than 75 per cent was in the output from Pennsylvania ovens. The Connellsville district alone produced 10,390,395 tons of coke in 1899, which was considerably more than 50 per cent of the total product in the United States, and more than three times the combined output of all the other districts of Pennsylvania.

The total coke production of Pennsylvania was nearly six times that of West Virginia, the second State in producing importance, and more than seven times that of Alabama, which comes third; and notwithstanding the extraordinary development in the two latter States during the past few years, there is nothing to indicate that Pennsylvania will occupy any other than her present preëminent position for many years to come.

The total number of ovens in existence on December 31, 1899, was 27,616, against 27,157 in 1898, a net gain of 459. The largest gain was in the Connellsville district, where a total of 367 new ovens was

added to the number reported in 1898. The number in the Upper Connellsville district increased 29. The Allegheny Mountain district added 100 new ovens (the Otto-Hoffman plant at Johnstown being increased by that number) and a decrease of 2 was reported in the number of beehive ovens, making a net gain of 98. The Pittsburg district shows a gain of 212 ovens, the Greensburg a gain of 89, the Broad Top a gain of 19, and the Irwin a gain of 1. Two districts, the Clearfield-Center and the Reynoldsville-Walston, showed a decrease in the number of ovens, the former from 668 to 450, a loss of 218, and the latter from 1,942 to 1,779, a loss of 163. The former also shows a decrease in production, but an apparently substantial increase is exhibited in the output of the Reynoldsville-Walston district, due to the inclusion of the production of the Semet-Solvay ovens at Syracuse, New York, and the Otto-Hoffman plant at Everett, Massachusetts, in the total for this district. There was no change in the number of ovens in the Allegheny Valley district, and all of them were idle. The completion and putting in blast, during 1899, of the 100 Otto-Hoffman ovens at Johnstown brings the total number of by-product ovens in the State up to 355.

Of the total number of ovens in Pennsylvania 941 were idle during the entire year, leaving 26,675 active, as compared with 25,626 active and 1,531 idle ovens in 1898. It is possible that there may have been more ovens idle in both years, as some of the larger operators make only one report for all the ovens in a certain county or district, stating the total number of ovens, but not indicating how many, if any, were not in operation. The figures quoted include only those actually reported as idle; but, assuming these to be approximately correct, we find that the average production for each active oven in 1898 was 418 tons and in 1899 was 509 tons.

The total number of establishments in the State was 150 in 1899 and 151 in 1898. Of these 17 were idle in 1898 and 7 in 1899. All of the idle concerns were comparatively small producers.

One of the apparently satisfactory conditions affecting the industry in 1899 was the advance in price, in which every district shared. This was due to a natural cause—the increased demand—and was not the result of arbitrary action in putting up the price, as was the case in 1896. Notwithstanding the increased values, however, much of the business was done at a loss, as the advances in mining and other wages largely increased the cost of production, and a large quantity of coke was sold at long contract prices which were below the cost of making.

In the following table the statistics are given of the production of coke in Pennsylvania for the years 1880 to 1899:

Statistics of the manufacture of coke in Pennsylvania from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens. per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880..	124	9,501	836	4,347,558	2,821,384	\$5,255,040	\$1.86	65
1881..	132	10,881	761	5,393,503	3,437,708	5,898,579	1.70	64
1882..	137	12,424	642	6,149,179	3,945,034	6,133,698	1.55	64
1883..	140	13,610	211	6,823,275	4,438,464	5,410,387	1.22	65
1884..	145	14,285	232	6,204,604	3,822,128	4,783,230	1.25	62
1885..	133	14,553	317	6,178,500	3,991,805	4,981,656	1.25	64.6
1886..	108	16,314	2,558	8,290,849	5,406,597	7,664,023	1.42	65.2
1887..	151	18,294	802	8,938,438	5,832,849	10,746,352	1.84	65.3
1888..	120	20,381	1,565	9,673,097	6,545,779	8,230,759	1.26	68
1889..	109	22,143	567	11,581,292	7,659,055	10,743,492	1.40	66
1890..	106	23,430	74	13,046,143	8,560,245	16,333,674	1.91	65.6
1891..	109	25,324	11	10,588,544	6,954,846	12,679,826	1.82	66
1892..	109	25,366	269	12,591,345	8,327,612	15,015,336	1.80	66.1
1893..	102	25,744	19	9,386,702	6,229,051	9,468,036	1.52	66
1894..	101	25,824	118	9,059,118	6,063,777	6,585,489	1.086	66.9
1895..	99	26,042	170	14,211,567	9,404,215	11,908,162	1.266	66.2
1896 ^a ..	158	26,658	154	11,124,610	7,356,502	13,182,859	1.792	66.1
1897 ^a ..	153	26,910	307	13,538,646	8,966,924	13,727,966	1.53	66.2
1898 ^a ..	151	27,157	292	16,307,841	10,715,302	16,078,505	1.50	65.7
1899 ^b ..	150	27,591	1,666	19,930,419	13,577,870	22,881,910	1.69	68.1

^a Includes coal used, coke produced, and its value, in New York.

^b Figures of last 5 columns include Massachusetts and New York.

The quality of the coal produced in the principal coking regions of Pennsylvania is such that little or no preparation is necessary before charging into the ovens. For this reason it is found that by far the larger portion of the coal used in the manufacture of coke in Pennsylvania is unwashed, generally from 80 to 90 per cent of the coal coked being unwashed run of mine. There was more coal washed in 1899 than ever before, both in amount and percentage. The amount of washed slack coal used in 1899 was 2.2 times that used in 1898. The total amount of washed coal used in 1899 was 1,250,929 short tons, or 6.3 per cent of the total. In 1898 the washed coal used was 752,421 tons, or 4½ per cent of the total. In 1897, 556,576 tons, or a little over 4 per cent, was washed, while in 1896 only about 3.5 per cent of the total was washed.

The character of the coal used in the manufacture of coke in Pennsylvania since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Pennsylvania since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	11, 788, 625	303, 591	630, 195	323, 732	13, 046, 143
1891.....	9, 470, 646	256, 807	558, 106	302, 985	10, 588, 544
1892.....	11, 237, 253	159, 698	1, 059, 994	134, 400	12, 591, 345
1893.....	8, 302, 307	216, 762	739, 128	128, 505	9, 386, 702
1894.....	8, 671, 534	118, 279	204, 811	64, 494	9, 059, 118
1895.....	13, 618, 376	34, 728	440, 869	117, 594	14, 211, 567
1896 <i>a</i>	9, 289, 089	273, 082	1, 463, 047	99, 392	11, 124, 610
1897 <i>a</i>	11, 540, 459	301, 052	1, 441, 611	255, 524	13, 538, 646
1898 <i>a</i>	14, 083, 073	350, 153	1, 472, 347	402, 268	16, 307, 841
1899 <i>b</i>	16, 854, 706	366, 206	1, 824, 784	884, 723	19, 930, 419

a Includes coal used in New York.

b Includes coal used in Massachusetts and New York.

PRODUCTION, BY DISTRICTS.

It is, perhaps, well to repeat briefly, for the sake of convenience, the statement published in previous volumes regarding the territory included within the several coking districts of the State. For more detailed descriptions the reader is referred to the earlier volumes of Mineral Resources.

The Allegheny Mountain district includes the ovens along the line of the Pennsylvania Railroad from Gallitzin eastward over the crest of the Alleghenies to beyond Altoona. The Allegheny Valley district includes the coke works of Armstrong and Butler counties and one of those in Clarion County, the other ovens in the latter county being included in the Reynoldsville-Walston district. What was previously known as the Beaver district included the ovens in Beaver and Mercer counties, but all the ovens in Beaver County have been abandoned and the operations of the 25 Semet-Solvay ovens in Mercer County are now included in the Pittsburgh district. The Blossburg and Broad Top district embraces the Blossburg and Broad Top coal fields. The ovens of the Clearfield-Center district are chiefly in the two counties from which it derives its name. The Connellsville district is the well-known region in western Pennsylvania, in Westmoreland and Fayette counties, extending from just south of Latrobe to Fairchance. The Greensburg, Irwin, Pittsburgh, and Reynoldsville-Walston districts include the ovens near the towns which have given the names to these districts. The Upper Connellsville district, sometimes called the Latrobe district, is near the town of Latrobe.

The Allegheny Valley district produced no coke in 1899, all the ovens being idle for the fifth time in its history. The ovens have not been reported as abandoned, however, and the number of ovens in the district are shown in the following tables. The Beaver district has been eliminated. All of the districts except the Irwin show an increased production in 1899, although part of the increase in the Reynoldsville-Walston district is due to the inclusion of the production in Massachusetts. An advance in price is shown in all the districts.

Coke production in Pennsylvania in 1899, by districts.

District.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Aver- age price per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
Allegheny Mountain ..	13	a 1,256	8	730,843	478,340	\$959,740	\$2.01	65.5
Allegheny Valley.....	2	116	0	0	0	0	0	0
Broad Top	5	519	3	161,196	107,258	197,895	1.85	66.5
Clearfield-Center	6	450	50	198,110	130,965	234,527	1.79	66.1
Connellsville	86	b 19,294	792	14,974,018	10,390,335	17,075,411	1.64	69.4
Greensburg	4	307	240	173,811	110,594	247,421	2.24	63.6
Irwin	5	697	0	223,457	133,085	197,694	1.48	59.6
Pittsburg	10	c 1,312	505	954,028	644,467	1,189,117	1.84	67.6
Reynoldsville - Wal- ston d	6	1,779	0	1,581,164	972,933	1,793,807	1.84	61.5
Upper Connellsville	13	1,861	68	933,792	609,893	986,298	1.62	65.3
Total.....	150	27,591	1,666	19,930,419	13,577,870	22,881,910	1.69	68.1

a Includes 160 Otto-Hoffman ovens.

b Includes 50 Semet-Solvay ovens.

c Includes 120 Otto-Hoffman and 25 Semet-Solvay ovens.

d Includes production and value of coke in Massachusetts and New York.

Coke production in Pennsylvania in 1898, by districts.

District.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Aver- age price per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
Allegheny Mountain ..	13	a 1,158	b 100	572,568	378,410	\$511,202	\$1.35	66
Allegheny Valley.....	2	116	0	0	0	0	0	0
Broad Top	5	500	4	122,820	80,935	124,882	1.543	65.9
Clearfield-Center	7	668	0	215,208	137,265	195,836	1.43	63.8
Connellsville	88	c 18,927	20	12,454,969	8,315,350	12,626,292	1.518	66.8
Greensburg	3	218	0	112,487	64,295	96,443	1.50	57
Irwin	5	696	0	332,368	183,176	239,583	1.308	55
Pittsburg	10	d 1,100	168	836,948	552,742	899,537	1.627	66
Reynoldsville - Wal- ston e	5	1,942	0	1,022,196	600,084	846,121	1.41	58.7
Upper Connellsville	13	1,832	0	638,277	403,045	538,609	1.34	63
Total.....	151	27,157	292	16,307,841	10,715,302	16,078,505	1.50	65.7

a Includes 60 Otto-Hoffman ovens.

b Otto-Hoffman ovens.

c Includes 50 Semet-Solvay ovens.

d Includes 120 Otto-Hoffman and 25 Semet-Solvay ovens.

e Includes production and value of coke in New York.

Coke production in Pennsylvania in 1897, by districts.

District.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Aver-age price per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
Allegheny Mountain ..	13	a 1,185	0	417,470	278,578	\$365,191	\$1.31	66.7
Allegheny Valley	2	116	0	8,300	5,000	10,000	2.00	60.2
Beaver	3	b 33	0	42,200	27,276	61,646	2.26	64.6
Broad Top	5	491	15	106,706	66,949	107,430	1.60	62.7
Clearfield-Center	7	668	0	230,395	153,517	197,139	1.28	66
Connellsville	86	c 18,467	92	10,243,690	6,860,826	10,662,428	1.55	67
Greensburg	3	178	0	81,927	52,495	65,619	1.25	64
Irwin	5	696	0	207,704	136,663	189,869	1.39	65.8
Pittsburg	9	d 1,233	200	832,505	548,981	864,326	1.57	66
Reynoldsville - W a l - stone	6	1,980	0	810,806	491,267	759,609	1.55	60.6
Upper Connellsville	14	1,863	0	556,941	345,372	444,709	1.29	62
Total	153	26,910	307	13,538,646	8,966,924	13,727,966	1.53	66.2

a Includes 60 Otto-Hoffman ovens.

b Includes 25 Semet-Solvay ovens.

c Includes 50 Semet-Solvay ovens.

d Includes 120 Otto-Hoffman ovens.

e Includes production and value of coal and coke in New York.

Allegheny Mountain district.—In this district are included all the ovens along the line of the Pennsylvania Railroad east of Blairsville and those in Somerset County. The district embraces the city of Johnstown and the coke ovens at that place. It enjoys the distinction of having the largest plant of by-product ovens in the State, and, with the exception of the plant at Everett, Massachusetts, the largest in the United States. The 100 Otto-Hoffman ovens, mentioned in the report for 1898 as under construction, were put in blast in 1899, making a total of 160 of these ovens at Johnstown. Two beehive ovens were abandoned, so that the district shows a net gain of 98 over 1898. The production in 1899 was the largest in the history of the district and about one-third larger than the record for 1898, while the value was nearly double that of the preceding year. The reports for 1899 show that 224 of the 1,256 ovens in the district were idle during the entire year.

The statistics of the manufacture of coke in the Allegheny Mountain district from 1880 to 1899 are as follows:

Statistics of the manufacture of coke in the Allegheny Mountain district of Pennsylvania from 1880 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens. per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				Short tons.	Short tons.			Per cent.
1880.....	8	291	0	201,345	127,525	\$289,929	\$2.27	63
1881.....	9	371	0	225,563	144,430	329,198	2.28	64
1882.....	10	481	0	284,544	179,580	377,286	2.10	63
1883.....	10	532	0	200,343	135,342	240,641	1.78	68
1884.....	12	614	0	241,459	156,290	203,213	1.30	65
1885.....	11	523	82	327,666	212,242	286,539	1.30	65
1886.....	10	579	14	351,070	227,369	374,013	1.64	64.8
1887.....	10	694	150	461,922	297,724	671,437	2.25	64.4
1888.....	12	950	145	521,047	335,689	479,845	1.43	64.4
1889.....	16	1,069	20	564,112	354,288	601,964	1.69	63.5
1890.....	16	1,171	0	633,974	402,514	730,048	1.81	63.5
1891.....	16	1,201	0	708,523	448,067	782,175	1.75	63
1892.....	16	1,260	0	724,903	448,522	775,927	1.73	61.9
1893.....	15	1,260	0	275,865	173,131	264,292	1.53	62.8
1894.....	15	1,253	0	92,965	58,823	71,161	1.21	63.3
1895.....	13	1,233	60	271,096	173,965	214,741	1.23	64
1896.....	13	a1,188	0	408,827	266,473	349,373	1.31	65
1897.....	13	a1,185	0	417,470	278,578	365,191	1.31	66.7
1898.....	13	a1,158	b100	572,568	378,410	511,202	1.35	66
1899.....	13	c1,256	8	730,843	478,340	959,740	2.01	65.5

a Includes 60 Otto-Hoffman ovens.

b Otto-Hoffman ovens.

c Includes 160 Otto-Hoffman ovens.

Connellsville district.—In the counties of Fayette and Westmoreland, which contain what is known as the Connellsville coking region, is produced annually more than 50 per cent of the total coke output of the United States. There has been only one exception to this in twenty years, the one exception being in 1896, when, because of the high prices arbitrarily placed on Connellsville coke by some of the larger producers, consumers were driven to other sources and the production of this region fell off one-third as compared with 1895. Lower prices and the beginning of the industrial revival in 1897 stimulated the demand somewhat in that year and the output was 1,400,000 tons more than in 1896, but was still 1,320,000 tons short of the production in 1895. The boom in the iron and steel trade which began in 1898 continued with increasing strength until October, 1899, and tested the pro-

ductive capacity of the region and the abilities of the transportation companies to the utmost. The production rose from 6,860,826 tons in 1897 to 8,315,350 tons in 1898, and to 10,390,395 tons in 1899, the output in 1899 being more than 20 per cent larger than that of 1898, and both years being the largest up to that time. The value of the product in 1899 was 30 per cent more than that of the preceding year, the price advancing from \$1.52 to \$1.64.

There was an increase of 367 in the number of ovens reported, and at the close of the year 792 ovens were in course of construction, the largest number of ovens building since 1888, and the largest, with two exceptions, in the history of the region.

The following are the statistics of the manufacture of coke in the Connellsville region from 1880 to 1899:

Statistics of the manufacture of coke in the Connellsville region, Pennsylvania, from 1880 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880...	67	7,211	731	3,367,856	2,205,946	\$3,948,643	\$1.79	65.5
1881...	70	8,208	654	4,018,782	2,639,002	4,301,573	1.63	65.7
1882...	72	9,283	592	4,628,736	3,043,394	4,473,789	1.47	65.8
1883...	74	10,176	101	5,355,380	3,552,402	4,049,738	1.14	66.3
1884...	76	10,543	200	4,829,054	3,192,105	3,607,078	1.13	66.1
1885...	68	10,471	48	4,683,831	3,096,012	3,776,388	1.22	66.1
1886...	36	11,324	1,895	6,305,460	4,180,521	5,701,086	1.36	66.3
1887...	73	11,923	98	6,182,846	4,146,989	7,437,669	1.79	67
1888...	38	12,818	1,320	7,191,708	4,955,553	5,884,081	1.19	69
1889...	29	14,458	430	8,832,371	5,930,428	7,974,633	1.34	67
1890...	28	15,865	30	9,748,449	6,464,156	11,537,370	1.94	66.3
1891...	33	17,551	0	7,083,705	4,760,665	8,903,454	1.87	67
1892...	31	17,309	0	9,389,549	6,329,452	11,598,407	1.83	67.4
1893...	28	17,504	5	7,095,491	4,805,623	7,141,031	1.49	67.7
1894...	29	17,829	0	7,656,169	5,192,080	5,405,691	1.04	67.8
1895...	29	18,028	80	12,174,597	8,181,179	10,122,458	1.237	67.2
1896...	88	18,347	0	8,107,536	5,462,490	10,018,946	1.834	67.4
1897...	86	18,467	92	10,243,690	6,860,826	10,662,428	1.55	67
1898...	88	18,927	20	12,454,969	8,315,350	12,626,292	1.518	66.8
1899...	86	19,294	792	14,974,018	10,390,335	17,075,411	1.64	69.4

a Includes 50 Semet-Solvay by-product ovens.

As will be seen in the above table, the number of ovens increased from 18,927 to 19,294, a gain of 367 over 1898. All of these are of the beehive type, with the exception of 50 Semet-Solvay ovens operated by the Dunbar Furnace Company at Dunbar.

The following table, compiled by the Connellsville Courier, of Connellsville, Pa., shows the shipments of coke from the Connellsville region in 1899, by months, in cars and tons, with the average number of cars shipped each working day in the month:

Shipments of coke from the Connellsville region in 1899, by months.

Month.	Cars.	Daily average.	Tons.
January	40,320	1,550	779,792
February	36,297	1,512	699,474
March	43,602	1,615	839,763
April	43,401	1,736	831,964
May	41,655	1,543	804,023
June	43,344	1,667	837,123
July	46,019	1,770	883,735
August	46,593	1,726	889,078
September	42,387	1,630	813,190
October	45,100	1,735	874,357
November	47,538	1,828	935,608
December	46,947	1,805	941,657
Total	523,203	1,676	10,129,764

The monthly shipments of coke from this region in the years 1896, 1897, 1898, and 1899, as reported by the Courier, are given in the following table:

Monthly shipments of coke from the Connellsville region in the years 1896, 1897, 1898, and 1899.

[Short tons.]

Month.	1896.	1897.	1898.	1899.
January	617,458	485,624	727,739	779,792
February	529,347	466,206	667,287	699,474
March	550,470	521,484	744,987	839,763
April	547,625	493,027	701,317	831,964
May	528,822	501,857	680,754	804,023
June	477,227	500,483	636,877	837,123
July	470,988	583,867	646,065	883,735
August	330,468	562,703	662,880	889,078
September	257,547	625,902	644,422	813,190
October	304,998	737,498	731,602	874,357
November	323,419	700,352	844,907	935,608
December	473,296	736,049	771,275	941,657
Total	5,411,665	6,915,052	8,460,112	10,129,764

The total shipments as given in the foregoing statement show comparatively insignificant differences between them and the total production as compiled by the Survey. In 1896 and 1899 the shipments reported by the Courier were less than the production, and in 1897 and 1898 slightly greater.

The same authority gives the monthly shipments of coke from the Connellsville region in cars during the years 1896, 1897, 1898, and 1899 to the three chief points of general distribution, with the total monthly output and the average daily shipment for each working day in the month, as follows:

Monthly shipments of coke from the Connellsville region, in cars, to points of distribution during 1896, 1897, 1898, and 1899.

[Cars.]

Month.	Pittsburg.	West.	East.	Total.	Daily average.
1896.					
January	9,454	15,455	6,946	31,855	1,180
February	8,524	13,670	5,240	27,434	1,093
March	8,454	15,879	4,345	28,678	1,103
April	9,332	15,522	3,823	28,677	1,103
May	8,992	15,458	3,551	28,001	1,077
June	8,440	12,892	4,295	25,627	985
July	8,535	12,406	4,613	25,554	946
August	7,014	7,442	3,833	18,289	703
September....	6,954	4,747	2,864	14,565	560
October	8,653	5,714	2,670	17,037	655
November	8,771	6,967	2,171	17,909	716
December	11,195	11,750	2,566	25,511	945
Total...	104,318	137,902	46,917	289,137	920
1897.					
January	10,583	11,856	3,755	26,194	1,008
February	9,727	11,487	4,146	25,360	1,056
March	10,881	12,808	4,754	28,443	1,053
April	11,787	10,610	4,573	26,970	1,037
May	11,574	10,228	5,767	27,569	1,060
June	11,900	9,923	5,855	27,678	1,065
July	13,841	11,663	5,784	31,288	1,159
August	13,210	10,900	5,597	29,707	1,140
September....	13,370	14,692	5,259	33,321	1,281
October	12,682	17,811	5,685	36,178	1,391
November	13,248	18,130	5,073	36,451	1,458
December	12,640	20,516	5,068	38,224	1,470
Total...	145,443	160,624	61,316	367,383	1,181

Monthly shipments of coke from the Connellsville region, in cars, to points of distribution during 1896, 1897, 1898, and 1899—Continued.

[Cars.]

Month.	Pittsburg.	West.	East.	Total.	Daily average.
1898.					
January	14,051	19,044	5,253	38,348	1,475
February	12,009	17,685	5,431	35,125	1,463
March	13,323	19,257	6,414	38,994	1,454
April	12,758	18,235	5,825	36,818	1,416
May	13,047	17,347	5,387	35,781	1,376
June	12,023	16,325	5,241	33,589	1,292
July	13,201	15,655	5,492	34,348	1,321
August	13,603	15,801	5,552	34,956	1,295
September....	11,856	16,547	5,448	33,851	1,302
October	13,250	19,330	5,892	38,472	1,480
November....	13,387	20,923	6,681	40,991	1,576
December	14,453	18,847	6,676	39,976	1,537
Total....	156,961	214,906	69,292	441,249	1,415
1899.					
January	13,826	20,559	5,935	40,320	1,550
February	12,402	18,694	5,201	36,297	1,512
March	13,886	22,741	6,975	43,602	1,615
April	13,738	22,699	6,964	43,401	1,736
May	14,154	20,850	6,651	41,655	1,543
June	13,905	22,194	7,245	43,344	1,667
July	15,052	22,674	8,293	46,019	1,770
August	13,348	25,118	8,127	46,593	1,726
September....	13,852	21,708	6,827	42,387	1,630
October	14,753	22,895	7,452	45,100	1,735
November....	13,925	25,542	8,071	47,538	1,828
December	13,741	25,258	7,948	46,947	1,805
Total....	166,582	270,932	85,689	523,203	1,676

The total shipments in cars for the last twelve years were as follows:

Total and daily average shipments in cars from 1888 to 1899.

Year.	Daily average.	Total cars.	Year.	Daily average.	Total cars.
1888.....	905	282,441	1894.....	900	281,677
1889.....	1,046	326,220	1895.....	1,410	441,243
1890.....	1,147	355,070	1896.....	920	289,137
1891.....	884	274,000	1897.....	1,181	367,383
1892.....	1,106	347,012	1898.....	1,415	441,249
1893.....	874	270,930	1899.....	1,676	523,203

The following table shows how prices were quoted throughout the year 1899:

Average monthly prices of Connellsville coke, per short ton, during 1899.

Month.	Furnace.		Foundry.		Crushed.
January	\$1. 60		\$1. 75 to \$2. 30		\$2. 30
February	1. 60		1. 90	2. 30	2. 30
March.....	\$1. 60 to 1. 75		2. 00	2. 30	2. 30
April.....	1. 75		2. 15	2. 30	2. 30
May	1. 75 to 2. 15		2. 15	2. 30	2. 30
June	2. 15	2. 25	2. 15	2. 30	2. 30
July	2. 15	2. 25	2. 15	2. 40	2. 40
August	2. 25	2. 50	2. 30	2. 50	2. 50
September.....	2. 50	2. 75	2. 50	3. 00	3. 00
October	2. 50	2. 75	2. 75	3. 00	3. 00
November	2. 60	3. 00	2. 75	3. 00	3. 00
December	2. 65	3. 00	3. 00	3. 25	3. 25

How the above compares with the prices for the corresponding months in 1898 may be seen below:

Average monthly prices of Connellsville coke, per short ton, during 1898.

Month.	Furnace.		Foundry.		Crushed.
January	\$1. 75		\$2. 15		\$2. 30
February	1. 75		2. 15		2. 30
March	1. 75		2. 15		2. 30
April	1. 75		2. 15		2. 30
May	1. 75		2. 15		2. 30
June	\$1. 50 to 1. 75		2. 15		2. 30
July	1. 50	1. 75	\$2 to	2. 15	2. 30
August	1. 50	1. 75	2	2. 15	2. 30
September	1. 50	1. 75	2	2. 15	2. 30
October	1. 50	1. 75	2	2. 15	2. 30
November	1. 50	1. 75	2	2. 15	2. 30
December	1. 50	1. 75	2	2. 15	2. 30

The following table gives the ruling and circular prices of blast-furnace coke free on board at the ovens for the last nineteen years:

Monthly prices of Connellsville blast-furnace coke free on board at ovens.

[Per short ton.]

Month.	1881.		1882.		1883.		1884.
January	\$1. 50 to \$1. 75		\$1. 70 to \$1. 80		\$1. 15 to \$1. 20		\$1. 00
February	1. 50	1. 75	1. 70	1. 80	1. 10	1. 20	1. 00
March	1. 50	1. 75	1. 70	1. 75		1. 05	1. 00
April	1. 60	1. 75	1. 70	1. 75		1. 05	1. 10
May	1. 60	1. 65	1. 65	1. 70	. 95	1. 05	1. 10
June	1. 60	1. 65	1. 50	1. 65		. 90	1. 10
July	1. 50	1. 60	1. 35	1. 50		. 90	1. 10
August		1. 60		1. 35		. 90	1. 10
September		1. 60	1. 25	1. 35		1. 00	1. 10
October	1. 60	1. 65		1. 25		1. 00	1. 10
November	1. 60	1. 65	1. 25	1. 35		1. 00	1. 10
December	1. 60	1. 70	1. 15	1. 35		1. 00	1. 10

Monthly prices of Connellsville blast-furnace coke free on board at ovens—Continued.

[Per short ton.]

Month.	1885.	1886.	1887.	1888.	1889.
January	\$1. 10	\$1. 20	\$1. 50	\$1. 75	\$1. 25
February	1. 10	1. 20	2. 00	1. 75	1. 25
March	1. 10	1. 35	2. 00	\$1. 25 to 1. 50	1. 25
April	1. 20	1. 35	2. 00	1. 00	1. 15
May	1. 20	1. 50	2. 00	1. 00	1. 10
June	1. 20	1. 50	2. 00	1. 00	1. 10
July	1. 20	1. 50	2. 00	1. 00	\$1. 00 to 1. 10
August	1. 20	1. 50	2. 00	1. 00	1. 10
September....	1. 20	1. 50	2. 00	1. 00	1. 25 1. 50
October	1. 20	1. 50	2. 00	1. 00	1. 50
November	1. 20	1. 50	2. 00	1. 25	1. 75
December	1. 20	1. 50	2. 00	1. 25	1. 75

Month.	1890.	1891.	1892.	1893.	1894.	1895.
January	\$1. 75	\$1. 90	\$1. 90	\$1. 90	\$0. 95 to \$1. 00	\$1. 00
February	1. 75	1. 90	1. 90	1. 90	. 95	1. 00
March	2. 15	1. 90	1. 90	1. 90	1. 00	1. 00
April	2. 15	1. 90	1. 90	1. 70	. 92	1. 35
May	2. 15	1. 90	1. 80	1. 60	. 92	1. 35
June	2. 15	1. 90	1. 80	1. 50	1. 00	1. 35
July	2. 15	1. 90	1. 75	1. 45	1. 00	1. 35
August	2. 15	1. 90	1. 75	1. 25	1. 15 2. 00	1. 35
September....	2. 15	1. 85	1. 75	1. 20	1. 30 1. 40	1. 35
October	2. 15	1. 85	1. 75	1. 20	1. 00	1. 60
November	2. 15	1. 80	1. 75	1. 10	1. 01	1. 60
December	2. 15	1. 80	1. 75	1. 05	1. 00	1. 60

Month.	1896.	1897.	1898.	1899.
January	\$1. 75 to \$2. 00	\$1. 75 to \$2. 00	\$1. 75	\$1. 60
February	1. 75 2. 00	1. 75 2. 00	1. 75	1. 60
March	1. 75 2. 00	1. 50 1. 75	1. 75	\$1. 60 to 1. 75
April	1. 75 2. 00	1. 50 1. 60	1. 75	1. 75
May	1. 75 2. 00	1. 30 1. 50	1. 75	1. 75 2. 15
June	1. 75 2. 00	1. 50	\$1. 50 to 1. 75	2. 15 2. 25
July	1. 75 2. 00	1. 50	1. 50 1. 75	2. 15 2. 25
August	1. 75 2. 00	1. 50	1. 50 1. 75	2. 25 2. 50
September....	1. 75 2. 00	1. 40 1. 50	1. 50 1. 75	2. 50 2. 75
October	1. 75 2. 00	1. 50 1. 75	1. 50 1. 75	2. 50 2. 75
November	1. 75 2. 00	1. 75	1. 50 1. 75	2. 60 3. 00
December	1. 75 2. 00	1. 75	1. 50 1. 75	2. 65 3. 00

Beaver district.—All the ovens in Beaver County, eight in number, were abandoned in 1898, and the statistics of production of coke in Mercer County have been included with the Pittsburg district.

The following are the statistics of the manufacture of coke in the Beaver district, Pennsylvania, for the years 1880 to 1897:

Statistics of the manufacture of coke in the Beaver district, Pennsylvania, from 1880 to 1897.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880	5	106	.....	8,013	4,880	\$10,150	\$2.08	61
1881	5	106	.....	6,887	4,333	9,013	2.08	63
1882	5	106	.....	11,699	7,960	15,124	1.90	68
1883	5	107	.....	19,510	12,395	21,062	1.70	64
1884	4	89	.....	2,250	1,390	2,168	1.56	62
1885	4	89	.....	686	438	696	1.59	63
1886	3	87	.....	698	411	646	1.57	59
1887	3	65	.....	25,207	13,818	24,137	1.75	55
1888	4	145	.....	262	175	260	1.48	66.6
1889	3	90	.....	3,100	1,853	3,848	2.07	60
1890	3	90	.....	4,010	2,148	4,564	2.12	53.5
1891	3	88	.....	4,224	2,332	6,663	2.86	55
1892	2	10	0	3,925	2,154	6,270	2.91	54.9
1893	2	10	0	2,998	1,644	4,446	2.70	54.8
1894	2	8	0	2,968	1,624	4,251	2.62	54.7
1895	2	8	0	2,888	1,584	3,940	2.49	54.8
1896	3	a35	0	13,845	9,004	17,200	1.91	65
1897	3	a33	0	42,200	27,276	61,646	2.26	64.6

a Includes 25 Semet-Solvay ovens in Mercer County.

Allegheny Valley district.—The ovens in Armstrong and Butler counties are included in this district. Production is irregular, all of the ovens having been idle five years in the last eight. They were idle in 1898 and 1899.

The statistics of the manufacture of coke in the Allegheny Valley district since 1880 are as follows:

Statistics of the manufacture of coke in the Allegheny Valley district, Pennsylvania, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880	5	97	0	45,355	23,470	\$49,068	\$2.10	52
1881	5	109	0	55,676	29,650	64,664	2.18	53
1882	6	159	0	76,000	41,897	80,294	1.92	55
1883	6	159	0	64,810	34,868	62,982	1.81	54
1884	7	209	0	55,110	31,430	54,859	1.75	57
1885	5	208	0	28,630	15,326	30,151	1.97	53.5
1886	5	208	0	51,580	28,948	44,422	1.54	56
1887	5	288	88	77,666	44,621	84,913	1.90	57.1
1888	5	376	0	37,792	21,719	36,008	1.66	57.5
1889	4	198	0	13,105	6,569	10,538	1.62	50
1890	3	148	0	33,049	18,733	40,204	2.15	56.7
1891	3	148	0	21,833	11,314	25,909	2.29	52
1892	3	148	0	0	0	0	0	0
1893	2	116	0	10,927	6,557	11,147	1.70	60
1894	2	116	0	0	0	0	0	0
1895	2	116	0	0	0	0	0	0
1896	2	116	0	12,445	7,467	14,934	2.00	60
1897	2	116	0	8,300	5,000	10,000	2.00	60.2
1898	2	116	0	0	0	0	0	0
1899	2	116	0	0	0	0	0	0

Reynoldsville-Walston district.—This district includes all the ovens on the Rochester and Pittsburg Railroad, as well as those on the Low Grade Division of the Allegheny Valley Railway, and the mines of the New York, Lake Erie and Western Railroad. Production in this district has increased regularly for the last five years. The production in 1899 includes that of Massachusetts, which makes an apparent increase of about 62 per cent over 1898. One hundred and sixty-three ovens in the district proper were abandoned in 1899, reducing the number from 1,942 to 1,779.

The following are the statistics of the manufacture of coke in the Reynoldsville-Walston district for the years 1880 to 1899:

Statistics of the manufacture of coke in the Reynoldsville-Walston district, Pennsylvania, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	3	117	0	45,055	28,090	\$46,359	\$1.65	62
1881.....	4	125	2	99,489	44,260	80,785	1.85	44
1882.....	5	177	0	87,314	44,709	80,339	1.80	51
1883.....	6	229	0	76,580	37,044	65,584	1.77	48
1884.....	7	321	0	159,151	78,646	113,155	1.44	49
1885.....	8	600	143	183,806	114,409	153,795	1.35	62
1886.....	9	783	500	271,037	161,828	217,834	1.35	59.7
1887.....	11	1,492	134	507,320	316,107	592,728	1.88	62.3
1888.....	9	1,636	100	404,346	253,662	320,203	1.26	62.7
1889.....	8	1,747	0	514,461	313,011	436,857	1.40	60.8
1890.....	8	1,737	0	652,966	406,184	771,996	1.90	62
1891.....	7	1,747	0	769,100	470,479	744,098	1.58	61
1892.....	8	1,734	0	683,539	425,250	743,227	1.75	62.2
1893.....	8	1,755	0	562,033	339,314	586,212	1.73	60.4
1894.....	8	1,755	0	336,554	207,238	297,596	1.44	61.6
1895.....	8	1,637	0	504,092	296,820	357,266	1.20	58.9
1896 ^a ...	7	1,852	34	770,104	445,998	673,625	1.51	57.9
1897 ^a ...	6	1,980	0	810,808	491,267	759,609	1.55	60.6
1898 ^a ...	5	1,942	0	1,022,196	600,084	846,121	1.41	58.7
1899 ^a ...	6	1,779	0	1,581,164	972,933	1,793,807	1.84	61.5

^a Includes coal used, coke produced, and its value in New York; also in Massachusetts for 1899.

Blossburg district.—This district, which was at one time of considerable importance as a coke-producing district, especially to central and western New York, produced very little coke in 1894 and 1895, and none in the last four years. The ovens have been abandoned.

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Statistics of the manufacture of coke in the Blossburg district, Pennsylvania, from 1880 to 1895.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	1	200	0	72,520	44,836	\$134,500	\$3.00	62
1881.....	1	200	0	88,055	56,085	168,250	3.00	64
1882.....	1	200	0	100,119	64,526	193,500	3.00	64
1883.....	2	344	0	71,028	44,690	122,450	2.74	63
1884.....	2	344	32	62,365	39,043	93,763	2.40	63
1885.....	2	296	0	46,489	26,975	59,423	2.17	58
1886.....	2	405	0	136,136	81,801	174,532	2.13	60
1887.....	2	406	0	182,623	103,873	234,622	2.26	56.9
1888.....	2	407	0	62,063	38,052	81,400	2.14	61
1889.....	2	407	0	31,806	18,422	47,765	2.59	58
1890.....	2	407	0	41,785	23,196	62,804	2.71	55.5
1891.....	2	407	0	46,084	24,351	66,195	2.72	53
1892.....	2	407	0	30,746	16,675	45,855	2.75	54.2
1893.....	2	407	0	22,176	11,463	31,427	2.74	51.7
1894.....	1	250	0	670	332	896	2.70	50
1895.....	1	200	0	976	488	1,220	2.50	50

Greensburg district.—A small number of ovens in the Greensburg coal basin is reported separately by this district. The district is not an important one, but considerable activity was exhibited there in 1899. The number of establishments was increased from 3 to 4, and the number of ovens from 218 to 307, while 240 were building at the close of the year. The production increased 50 per cent over 1898, and has increased each year since 1894. The 307 completed ovens in 1899 included 80 that were not in operation during the year.

Statistics of the manufacture of coke in the Greensburg district, Pennsylvania, from 1889 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1889.....	2	50	16	32,070	20,459	\$21,523	\$1.05	63.8
1890.....	2	58	0	44,000	30,261	44,290	1.46	68.7
1891.....	2	58	0	38,188	22,441	36,627	1.63	59
1892.....	2	58	0	15,005	9,037	13,173	1.46	60.2
1893.....	3	86	0	29,983	18,393	26,303	1.43	61
1894.....	3	118	0	27,290	15,872	18,413	1.16	58.2
1895.....	3	118	0	31,300	20,309	22,340	1.10	65
1896.....	3	178	0	36,963	24,642	30,928	1.255	66
1897.....	3	178	0	81,927	52,495	65,619	1.25	64
1898.....	3	218	0	112,487	64,295	96,443	1.50	57
1899.....	4	307	240	173,811	110,594	247,421	2.24	63.6

Pittsburg district.—Much of the coal made into coke in the Pittsburg district is slack, usually obtained from the mines along the several pools of the Monongahela River and brought to Pittsburg by barges. Some run-of-mine coal is also brought from the fourth pool of the Monongahela River for coking at Pittsburg. The production of the district has increased steadily each year since 1890, and it is now the third district in the State as a producer of coke. The number of ovens in existence increased from 1,100 in 1898 to 1,312 in 1899, and 505 additional ovens were building at the close of the year. These include 120 Otto-Hoffman and 25 Semet-Solvay by-product ovens. Of the 1,312 ovens in the district 108 were idle in 1899.

The statistics of the manufacture of coke in the Pittsburgh district, Pennsylvania, for the years 1880 to 1899 are stated in the following table:

Statistics of the manufacture of coke in the Pittsburgh district, Pennsylvania, from 1880 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	21	534	0	194,393	105,974	\$254,500	\$2.40	55
1881.....	21	538	0	178,509	96,310	206,965	2.15	54
1882.....	21	557	0	114,956	64,779	134,378	2.07	56.3
1883.....	20	542	0	119,310	66,820	126,020	1.89	56
1884.....	20	535	0	97,367	53,857	99,911	1.87	55
1885.....	17	416	4	91,101	46,930	72,509	1.55	51.5
1886.....	18	730	0	228,874	138,646	221,617	1.88	60.6
1887.....	20	880	235	366,184	177,097	315,546	1.78	48.4
1888.....	22	980	0	428,899	264,156	350,818	1.33	62
1889.....	17	600	21	233,571	141,324	283,402	2.00	60.5
1890.....	14	541	0	149,230	93,984	171,465	1.82	63
1891.....	13	590	11	154,054	94,160	201,458	2.14	61
1892.....	15	725	261	292,357	176,365	376,613	2.14	60.3
1893.....	10	885	0	357,400	216,268	438,801	2.03	60.5
1894.....	9	779	104	371,569	227,100	351,825	1.55	61
1895.....	9	973	0	452,845	232,529	547,284	2.35	51.3
1896.....	11	1,264	a 120	583,984	368,070	941,076	2.56	63
1897.....	9	b 1,233	200	832,505	548,981	864,326	1.57	66
1898.....	10	c 1,100	168	836,948	552,742	899,537	1.627	66
1899.....	10	c 1,312	505	954,028	644,467	1,189,117	1.84	67.6

a Otto-Hoffman by-product ovens.

b Includes 120 Otto-Hoffman ovens.

c Includes 120 Otto-Hoffman and 25 Semet-Solvay ovens.

Clearfield-Center district.—This district includes the ovens in Clearfield and Center counties, including Snow Shoe, Moshannon, and other well-known coal districts. The number of establishments was reduced from 7 to 6 in 1899, the number of ovens from 668 to 450, and the production from 137,265 to 130,965 tons. There were, however, 50 new ovens in course of construction at the close of 1899. The plant of 218 ovens abandoned in 1899 had not been in active operation for some time. In addition to these there were 30 ovens not running during 1899.

The statistics of the manufacture of coke in the Clearfield-Center district for the years 1880 to 1899 are as follows:

Statistics of the manufacture of coke in the Clearfield-Center district, Pennsylvania, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	1	0	0	200	100	\$200	\$2.00	50
1881.....	2	50	0	20,025	13,350	22,695	1.70	67
1882.....	1	50	0	25,000	17,160	27,406	1.60	69
1883.....	1	60	0	26,500	18,696	28,844	1.50	71
1884.....	1	60	0	33,000	23,431	32,849	1.40	71
1885.....	2	245	0	69,720	48,103	70,331	1.46	69
1886.....	3	299	20	84,870	55,810	94,877	1.70	66
1887.....	6	523	10	154,566	97,852	198,095	2.02	63.3
1888.....	6	601	0	172,999	115,338	174,220	1.51	66.6
1889.....	6	671	0	195,473	120,734	215,112	1.78	61.7
1890.....	7	701	0	331,104	212,286	391,957	1.85	64
1891.....	7	666	0	293,542	183,911	339,082	1.84	63
1892.....	7	731	0	231,357	147,819	264,422	1.79	63.9
1893.....	8	695	0	155,119	98,650	171,482	1.74	63.6
1894.....	8	694	0	61,428	38,825	51,482	1.33	63
1895.....	8	695	0	155,088	99,469	131,188	1.32	64
1896.....	7	666	0	183,056	118,155	164,266	1.39	64.5
1897.....	7	668	0	230,395	153,517	197,139	1.28	66
1898.....	7	668	0	215,208	137,265	195,836	1.43	63.8
1899.....	6	450	50	198,110	130,965	234,527	1.79	66.1

Broad Top district.—This district includes the ovens situated in Bedford and Huntingdon counties, comprising what is known as the Broad Top coal field. There were 519 completed ovens in the field in 1899, a gain of 19 over 1898. Of these, 208 were idle in 1899, as compared with 232 idle ovens in 1898. The production of the district increased 25 per cent, but was not up to the record made from 1883 to 1890.

The statistics of the manufacture of coke in the Broad Top region from 1880 to 1899 are shown in the following table:

Statistics of the manufacture of coke in the Broad Top region, Pennsylvania, from 1880 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	5	188	105	92,894	51,130	\$123,748	\$2.40	55
1881.....	5	188	105	111,593	66,560	167,074	2.51	59
1882.....	5	293	50	170,637	105,111	215,079	2.05	62
1883.....	5	343	110	220,932	147,154	271,692	1.84	66
1884.....	5	453	0	227,954	151,959	264,569	1.74	66
1885.....	5	537	0	190,836	112,073	185,656	1.65	58
1886.....	5	562	100	171,137	108,294	187,321	1.73	63.3
1887.....	5	581	0	262,730	164,535	347,061	2.11	62.6
1888.....	5	591	0	196,015	119,469	286,655	2.40	61
1889.....	5	589	0	152,090	91,256	186,718	2.05	60
1890.....	5	482	16	247,823	157,208	314,416	2.00	63
1891.....	5	448	0	146,008	90,728	197,048	2.17	62
1892.....	5	448	8	185,600	117,554	216,090	1.84	63.3
1893.....	5	456	14	136,069	86,752	150,196	1.73	63.8
1894.....	5	454	14	53,216	34,089	51,815	1.52	64
1895.....	5	460	0	133,276	85,842	150,224	1.75	64.4
1896.....	5	480	0	111,145	72,175	126,306	1.75	64.9
1897.....	5	491	15	106,706	66,949	107,430	1.60	62.7
1898.....	5	500	4	122,820	80,935	124,882	1.543	65.9
1899.....	5	519	3	161,196	107,258	197,895	1.84	66.5

Upper Connellsville district.—The Upper Connellsville district includes that portion of the Connellsville trough or basin lying north of a point a short distance below Latrobe. The coal differs somewhat from that of the lower part of the basin, so that in addition to its geographical position there is another reason for the separation of the production of this field from that of the Connellsville field proper. The production of this district in 1899 was 609,893 short tons, the largest in any one year except in 1891, when the product exceeded that of last year by nearly 40,000 tons. Compared with 1898, the production in 1899 showed an increase of over 50 per cent, while the value of the product increased over 80 per cent. The average price obtained in the district during 1899 was \$1.61, an advance of 27 cents over 1898, and the highest figure recorded since 1891. A gain of 29 ovens is shown in the number credited to the district, and 68 others were in course of

construction at the close of the year. Of the 1,861 ovens in the district at the close of 1899, 174 were idle throughout the year.

The following are the statistics of the manufacture of coke in the Upper Connellsville region for the years 1880 to 1899:

Statistics of the manufacture of coke in the Upper Connellsville district, Pennsylvania, from 1880 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	8	757	0	319,927	229,433	\$397,945	\$1.73	72
1881.....	10	986	0	588,924	343,728	548,362	1.60	58
1882.....	11	1,118	0	650,174	375,918	536,503	1.43	58
1883.....	11	1,118	0	668,882	389,053	422,174	1.08	58
1884.....	11	1,118	0	496,894	294,477	311,665	1.06	59
1885.....	11	1,168	40	555,735	319,297	346,168	1.08	57
1886.....	12	1,337	29	691,331	442,968	572,073	1.29	64.1
1887.....	16	1,442	87	717,274	470,233	840,144	1.79	65.6
1888.....	16	1,977	0	657,966	441,966	617,189	1.40	67
1889.....	13	1,568	80	635,220	417,263	609,828	1.46	65.6
1890.....	14	1,569	28	889,277	577,246	1,008,102	1.75	64.9
1891.....	14	1,724	0	1,000,184	649,316	1,111,056	1.71	65
1892.....	14	1,843	0	706,171	451,975	691,323	1.53	64
1893.....	14	1,843	0	499,809	320,793	447,090	1.39	64
1894.....	14	1,843	0	279,971	176,799	212,595	1.20	63
1895.....	14	1,849	30	319,285	208,158	251,892	1.21	65
1896.....	14	1,863	0	617,601	406,112	570,687	1.405	65.7
1897.....	14	1,863	0	556,941	345,372	444,709	1.29	62
1898.....	13	1,832	0	638,277	403,045	538,609	1.34	63
1899.....	13	1,861	68	933,792	609,893	986,298	1.62	65.3

Irwin district.—The Irwin district comprises the ovens situated near the town of that name; also those located in what may be termed the Irwin basin, on the Youghiogheny River. Most of the coke made in the district is produced by the Carnegie Steel Company, Limited, at Larimer and Douglas, where slack from the gas coal mined in the immediate vicinity is made into coke. The production in 1899 was the smallest in four years, and with two exceptions the smallest since 1889. Compared with 1898 there was a decrease of 50,091 tons, or 27.4 per cent. The number of ovens reported for the district in 1899 was 697, of which 117 were idle.

The statistics of the manufacture of coke in the Irwin district from 1889 to 1899 are shown in the following table:

Statistics of the manufacture of coke in the Irwin district, Pennsylvania, from 1889 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1889.....	4	666	0	373,913	243,448	\$351,304	\$1.44	65
1890.....	4	661	0	270,476	172,329	256,458	1.49	63.7
1891.....	4	666	0	323,099	197,082	266,061	1.35	61
1892.....	4	666	0	328,193	202,809	284,029	1.40	61.8
1893.....	5	725	0	238,832	150,463	175,609	1.30	63
1894.....	5	725	0	176,318	110,995	119,764	1.08	63
1895.....	5	725	0	166,124	103,872	105,609	1.017	62.5
1896.....	5	696	0	279,104	175,916	275,518	1.566	63
1897.....	5	696	0	207,704	136,663	189,869	1.39	65.8
1898.....	5	696	0	332,368	183,176	239,583	1.308	55
1899.....	5	697	0	223,457	133,085	197,694	1.48	59.6

TENNESSEE.

Tennessee now ranks sixth among the coke-producing States, having dropped behind Colorado and Virginia in 1898. As was the case throughout the United States generally, the production in 1899 showed a substantial increase over 1898, and exceeded that of any previous year. As compared with 1898 the product increased 40,763 short tons, or 10.3 per cent, accompanied by an increase of \$207,766, or nearly 33 per cent, in value.

The number of establishments operating in the State has been reduced by one, from 15 to 14, the East Tennessee Iron and Coal Company, at Pioneer, having discontinued the manufacture of coke and abandoned the 18 ovens at that place. There were, however, 109 new ovens constructed in other parts of the State, making a net gain of 91, and increasing the total number in the State from 1,949 to 2,040. The ovens reported as idle in 1899 were 280, as compared with 198 in 1898 and 170 in 1897.

The following are the statistics of the manufacture of coke in Tennessee for the years 1880 to 1899:

Statistics of manufacture of coke in Tennessee from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				Short tons.	Short tons.			Per cent.
1880.....	6	656	68	217,656	130,609	\$316,607	\$2.42	60
1881.....	6	724	84	241,644	143,853	342,585	2.38	60
1882.....	8	861	14	313,537	187,695	472,505	2.52	60
1883.....	11	992	10	330,961	203,691	459,126	2.25	62
1884.....	^a 13	1,105	175	348,295	219,723	428,870	1.95	63
1885.....	12	1,387	36	412,538	218,842	398,459	1.82	53
1886.....	12	1,485	126	621,669	368,139	687,865	1.87	59
1887.....	11	1,560	165	655,857	396,979	870,900	2.19	61
1888.....	11	1,634	84	630,099	385,693	490,491	1.27	61
1889.....	12	1,639	40	626,016	359,710	731,496	2.03	57
1890.....	11	1,664	292	600,387	348,728	684,116	1.96	58
1891.....	11	1,995	0	623,177	364,318	701,803	1.93	58
1892.....	11	1,941	0	600,126	354,096	724,106	2.05	59
1893.....	11	1,942	0	449,511	265,777	491,523	1.85	61
1894.....	11	1,860	0	516,802	292,646	480,124	1.64	56.6
1895.....	12	1,903	0	684,655	396,790	754,926	1.90	57.9
1896.....	15	1,861	100	600,379	339,202	624,011	1.84	56.5
1897.....	15	1,948	0	667,996	368,769	667,656	1.81	55
1898.....	15	1,949	40	722,356	394,545	642,920	1.63	54.6
1899.....	14	2,040	62	779,995	435,308	850,686	1.95	55.8

^a One establishment made coke in pits.

The coal used in the manufacture of coke in Tennessee is about equally divided between run of mine and slack, and the larger part of both is washed before coking. In 1899 about 75 per cent of all the coal used was washed. Of the slack coal used 86 per cent was washed, as was nearly two-thirds of the run of mine.

The character of the coal used in the manufacture of coke in Tennessee since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Tennessee since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	255,359	0	273,028	72,000	600,387
1891.....	184,556	0	377,914	60,707	623,177
1892.....	176,453	15,000	367,827	40,846	600,126
1893.....	179,126	0	137,483	132,902	449,511
1894.....	166,990	61,841	149,958	138,013	516,802
1895.....	96,744	59,284	285,906	242,721	684,655
1896.....	0	206,319	219,231	174,829	600,379
1897.....	36,485	400,166	119,755	111,590	667,996
1898.....	37,217	306,969	122,756	255,414	722,356
1899.....	140,804	267,105	31,850	340,236	779,995

TEXAS.

The 20 ovens mentioned in the report for 1897 as having been erected by the Texas and Pacific Coal Company for converting its slack coal into coke have not proved the success that was hoped for, and they have been abandoned.

UTAH.

As there is but one establishment making coke in Utah, detailed statistics of production have been included with that of Colorado in order to preserve the confidential nature of the producer's report and as the coals in this State are practically identical in character with those of western Colorado.

The following is the amount of coke produced in Utah from 1889 to 1899:

Production of coke in Utah from 1889 to 1899.

Year.	Tons.	Year.	Tons.
1889.....	761	1895.....	22,519
1890.....	8,528	1896.....	20,447
1891.....	7,949	1897.....	23,617
1892.....	7,309	1898.....	28,826
1893.....	16,005	1899.....	26,881
1894.....	16,056		

VIRGINIA.

Virginia is rapidly coming to the front as a producer of coke, the development in the State having been particularly active during the last six years, and ranks now as the fourth among the coke-producing States. The production in 1899 amounted to 618,707 short tons, an increase of 87,546 tons, or 16.5 per cent, over that of 1898, and of 264,724 tons, or 75 per cent, over 1897. Practically all of this increase has been the result of the development in Wise County, on the Clinch River division of the Norfolk and Western Railroad. The returns for 1899 indicate that the production from this region is likely to show a considerable further increase in 1900, as 429 new ovens (the entire number reported for the State) were building in the district at the close of 1899. Twenty-eight ovens were added to the number of ovens in the State during 1899. Prior to 1895 there were only two establishments in the State, one of which was at Pocahontas, in the Flat Top coal region, the other at Low Moor, just east of the West Virginia line. The coal for the Pocahontas ovens is drawn from mines which extend beyond the boundary line between Virginia and West Virginia, and much if not the greater part of the product belongs of right to the latter State. It has been customary, however, to credit all of the product to Virginia, as the openings are in that State. The ovens at Low Moor are fed entirely by coal mined in the New River district of West Virginia. The Clinch Valley or Wise County product belongs entirely to Virginia, and the manufacture of coke from coal mined in the State really began with the building of the ovens in Wise County in 1895. Over 60 per cent of the coke product in 1897, 1898, and 1899 was from this region.

The following are the statistics of the manufacture of coke in Virginia from 1888 to 1899:

Statistics of the manufacture of coke in Virginia from 1888 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1883...	1	200	0	39,000	25,340	\$44,345	\$1.75	65
1884...	1	200	0	99,000	63,600	111,300	1.75	64.3
1885...	1	200	0	81,899	49,139	85,993	1.75	60
1886...	2	350	100	200,018	122,352	305,880	2.50	61.2
1887...	2	350	300	235,841	166,947	417,368	2.50	70.8
1888...	2	550	0	230,529	140,199	260,000	1.74	64.7
1889...	2	550	250	238,793	146,528	325,861	2.22	61
1890...	2	550	250	251,683	165,847	278,724	1.68	66
1891...	2	550	250	285,113	167,516	265,107	1.58	58.8
1892...	2	594	206	226,517	147,912	322,486	2.18	65.3
1893...	2	594	206	194,059	125,092	282,898	2.26	64.5
1894...	2	736	100	280,524	180,091	295,747	1.64	64.2
1895...	5	832	350	410,737	244,738	322,564	1.32	59.6
1896...	7	1,138	101	454,964	268,081	404,573	1.509	58.9
1897...	6	1,453	110	574,542	354,067	495,864	1.40	61.6
1898...	6	a 1,564	0	852,972	531,161	699,781	1.317	62
1899...	6	a 1,588	429	994,635	618,707	1,071,284	1.73	62.2

a Includes 60 Newton-Chambers by-product ovens.

Up to 1895 all of the coal used in coke making in Virginia was unwashed. Washing slack coal began in 1896 and 13,584 tons, or about 4 per cent of the slack used in that year was washed. The next year over 60,000 tons of slack were washed, and in 1898 the washed slack coal used amounted to over 210,000 tons. The amount of washed slack used in 1899 was about 25 per cent less than in 1898, the decrease being probably due to the extraordinary demand for coke in 1899, which made it necessary to use a larger amount of run of mine coal, which was used without washing. The run of mine coal used in 1899 was 50 per cent more than that of 1898.

The character of the coal used in the manufacture of coke in Virginia since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Virginia since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	98, 215	0	153, 468	0	251, 683
1891.....	107, 498	0	177, 615	0	285, 113
1892.....	106, 010	0	120, 507	0	226, 517
1893.....	107, 498	0	86, 561	0	194, 059
1894.....	103, 874	0	176, 650	0	280, 524
1895.....	114, 802	0	295, 935	0	410, 737
1896.....	70, 756	0	370, 624	13, 584	454, 964
1897.....	286, 158	0	227, 363	61, 021	574, 542
1898.....	405, 399	0	237, 474	210, 099	852, 972
1899.....	612, 267	0	225, 118	157, 250	994, 635

WASHINGTON.

The production of coke in Washington during 1899 was only a fraction of 1 per cent more than that of 1898, so that except for an increase of about \$22,000 in value the industry may be said to have remained practically stationary. There were the same number of establishments, the same number of ovens, the same production, and no new ovens were building. The operations in Washington are not important when considered with the production in some of the Eastern States, but they are the only ovens on the Pacific coast, and are interesting as establishing the adaptability of Washington coals for coke making.

The industry was started in 1884, since which time the production has been as follows:

Statistics of the production of coke in Washington from 1884 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1884.....	1	0	0	700	400	\$1,900	\$4.75	57.5
1885.....	1	2	0	544	311	1,477	4.75	57
1886.....	1	11	21	1,400	825	4,125	5.00	58.9
1887.....	1	30	0	22,500	14,625	102,375	7.00	65
1888.....	1	30	100	0	0	0	0	0
1889.....	1	30	0	6,983	3,841	30,728	8.00	55
1890.....	2	30	80	9,120	5,837	46,696	8.00	64
1891.....	2	80	0	10,000	6,000	42,000	7.00	60
1892.....	3	84	30	12,372	7,177	50,446	7.03	58
1893.....	3	84	0	11,374	6,731	34,207	5.08	59
1894.....	3	84	0	8,563	5,245	18,249	3.48	61.2
1895.....	3	110	0	22,973	15,129	64,632	4.27	65.9
1896.....	3	120	0	38,685	25,949	104,894	4.04	67
1897.....	3	120	0	39,124	26,189	115,754	4.42	67
1898.....	2	90	0	48,559	30,197	128,933	4.27	62.2
1899.....	2	90	0	50,813	30,372	151,216	4.98	59.8

The character of the coal used in the manufacture of coke in Washington since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Washington since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	0	9,120	0	0	9,120
1891.....	0	0	10,000	0	10,000
1892.....	0	0	0	12,372	12,372
1893.....	0	10,974	0	405	11,379
1894.....	0	0	0	8,563	8,563
1895.....	0	0	0	22,973	22,973
1896.....	0	20,967	0	17,718	38,685
1897.....	0	39,124	0	0	39,124
1898.....	0	48,559	0	0	48,559
1899.....	0	44,681	0	6,132	50,813

WEST VIRGINIA.

West Virginia ranks next to Pennsylvania as a coke-producing State, having in 1899 an output nearly 500,000 tons more than Alabama, which ranks third in importance, and which, until passed by West Virginia in 1896, stood next to Pennsylvania. The production in West Virginia in 1899 amounted to 2,278,577 short tons, an increase as compared with 1898 of 353,506 tons, or 18.36 per cent. The value of the product increased from \$2,432,657 in 1898 to \$3,480,408, a gain of \$1,047,751, or 43 per cent. With only two exceptions the production of coke in West Virginia has shown a steady annual increase since 1880. The average price obtained in 1899 was the highest since 1893, but lower than in any year from 1880 to 1893. The advance in price from 1898 to 1899 would have been considerably more than it was except for the fact that the product was largely sold on contracts made in 1898, and the prices, owing to the advance in mining and other wages, was in many cases less than the cost of production.

The coking regions of West Virginia have been separated by the late Joseph D. Weeks into five distinct districts, and the nomenclature adopted by Mr. Weeks has become generally recognized, viz, the Kanawha, the New River, the Flat Top, the Upper Monongahela, and the Upper Potomac. The first two are compact and continuous. They include the ovens along the line of the Chesapeake and Ohio Railroad from west of Lowmoor, in Virginia, to the Kanawha Valley. The Flat Top region includes the ovens in what is sometimes called the Pocahontas district. The fourth district, the Upper Monongahela or Northern, is a scattered one, including the ovens in Preston, Taylor, Harrison, and Marion counties, on the upper waters of the Monongahela River. The district which has been termed the Upper Potomac includes the coke ovens in the Elk Garden and Upper Potomac fields. These districts have been so frequently described that it is not necessary to repeat the description at this point, but those interested are referred to previous volumes of Mineral Resources.

Production in 1899 was larger than in 1898 in four out of the five districts mentioned. There was a slight falling off in the New River district but all the others made substantial gains, the most significant of which was in the Upper Monongahela district, where the product in 1899 was nearly double that of 1898, and the district advanced from fourth in importance in 1897 and 1898 to second place in 1899. The production of the 60 Semet-Solway ovens at Wheeling which were put in blast in December, 1898, are included in this district for want of a better classification. All five of the districts shared in the general advance in price, the advances ranging from 13 cents in the Flat Top district to 58 cents in the Upper Monongahela district. The total value of the product in the latter district was in 1899 more than three times what it was in 1898.

The following table exhibits the statistics of coke production in West Virginia since 1880:

Statistics of the manufacture of coke in West Virginia from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880...	18	631	40	230,758	138,755	\$318,797	\$2.30	60
1881...	19	689	0	304,823	187,126	429,571	2.30	61
1882...	22	878	0	366,653	230,398	520,437	2.26	63
1883...	24	962	9	411,159	257,519	563,490	2.19	63
1884...	27	1,005	127	385,588	223,472	425,952	1.91	62
1885...	27	978	63	415,533	260,571	485,588	1.86	63
1886...	29	1,100	317	425,002	264,158	513,843	1.94	62
1887...	39	2,080	742	698,327	442,031	976,732	2.21	63.3
1888...	51	2,764	318	854,531	525,927	896,797	1.71	61.5
1889...	53	3,438	631	1,001,372	607,880	1,074,177	1.76	60
1890...	55	4,060	334	1,395,266	833,377	1,524,746	1.83	60
1891...	55	4,621	555	1,716,976	1,009,051	1,845,043	1.83	58.8
1892...	72	5,843	978	1,709,183	1,034,750	1,821,965	1.76	60.5
1893...	75	7,354	132	1,745,757	1,062,076	1,716,907	1.62	60.8
1894...	78	7,858	60	1,976,128	1,193,933	1,639,687	1.373	60.4
1895...	78	7,834	55	2,087,816	1,285,206	1,724,239	1.34	61.6
1896...	84	8,351	28	2,687,104	1,649,755	2,259,999	1.37	61.4
1897...	84	8,404	38	2,413,283	1,472,666	1,933,808	1.31	61
1898...	87	8,659	161	3,145,398	1,925,071	2,432,657	1.26	61.2
1899...	87	8,846	619	3,802,825	2,278,577	3,480,408	1.53	60

^a Includes 60 Semet-Solvay ovens at Wheeling.

^b Includes 60 Semet-Solvay ovens building at Wheeling.

It will be seen from the foregoing table that there have been only two exceptions in nineteen years to a steadily increasing production. The first instance was in 1884, and was unimportant; the second was in 1897, and was due to a natural reaction from an exceptional production in 1896 caused by high prices and a restricted production in the Connellsville region of Pennsylvania.

It appears also from this table that the number of completed ovens in West Virginia in 1899 was 8,846 against 8,659 in 1898, a gain of 187. The number of idle ovens reported in 1899 was 1,040 against 568 ovens idle in 1898. The idle ovens in 1899 were distributed among the different districts as follows: Flat Top, 419; Kanawha, 12; New River, 151; Upper Monongahela, 458; Upper Potomac, 0. It will be seen from this that all of the ovens in the Upper Potomac district were in operation during the year.

The following table shows that the larger part of the coal used in the manufacture of coke in West Virginia is slack, and the most of this is unwashed. It will be noted that there was a significant increase in the amount of run of mine coal used in 1899. This was undoubtedly due to the enormous demand for coke during the year and to an insufficient supply of slack coal to meet the requirements.

The character of the coal used in the manufacture of coke in West Virginia since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in West Virginia since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	Short tons.	Short tons.	Short tons.	Short tons.
1890.....	324,847	0	930,989	159,430	1,395,266
1891.....	276,259	0	1,116,060	324,657	1,716,976
1892.....	298,824	115,397	1,108,353	186,609	1,709,183
1893.....	324,932	15,240	1,176,656	228,929	1,745,757
1894.....	162,270	14,901	1,607,735	191,222	1,976,128
1895.....	405,725	24,054	1,476,003	182,034	2,087,816
1896.....	407,378	33,096	2,079,237	167,393	2,687,104
1897.....	373,205	28,145	1,800,528	211,405	2,413,283
1898.....	713,815	0	2,137,983	293,600	3,145,398
1899.....	1,336,239	0	2,215,255	251,331	3,802,825

PRODUCTION BY DISTRICTS.

Three of the coke-producing districts of West Virginia are in the southern part of the State and two are in the northern portion. All three of the southern districts—the Flat Top, the New River, and the Kanawha—are drained by the New River, or its western end, the Kanawha. The northern districts, as their names imply, are drained respectively by the headwaters of the Potomac and Monongahela rivers. The Upper Potomac is the only district on the eastern slope of the Allegheny Mountains, and is the nearest coking field to the seaboard in the United States. The Flat Top district is by far the most important, and bears a similar relation to the other districts of West Virginia as the Connellsville district does to those of Pennsylvania. Of the total product in West Virginia in 1899, 50 per cent was in the Flat Top district, as against 55 per cent in 1898. The phenomenal increase in the Upper Monongahela district in 1899 puts that district in second place instead of the New River district, which drops back to fourth place, the Upper Potomac district maintaining its position as third in importance. The value of the product in each district except the Kanawha exceeded \$500,000 in 1899.

In the following tables are exhibited the statistics of coke production in West Virginia, by districts, during the last three years:

Production of coke in West Virginia in 1899, by districts.

District.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke produced.	Aver- age price of coke per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
Flat Top	35	4,623	214	1,861,570	1,138,389	\$1,453,601	\$1.28	61.1
Kanawha	8	653	88	323,506	190,337	364,148	1.91	58.8
New River	22	1,444	167	503,160	281,134	533,996	1.90	56
Upper Monongahela.	19	a 1,458	b 60	607,796	362,872	596,305	1.64	59.7
Upper Potomac	3	673	90	506,793	305,845	582,358	1.74	60.3
Total	87	8,846	619	3,802,825	2,278,577	3,480,408	1.58	60

a Includes 60 Semet-Solvay ovens.

b All Semet-Solvay ovens.

Production of coke in West Virginia in 1898, by districts.

District.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke produced.	Aver- age price of coke per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
Flat Top	36	4,667	27	1,701,404	1,057,626	\$1,216,069	\$1.15	62.2
Kanawha	8	622	100	225,240	135,867	208,949	1.538	60
New River	18	1,299	4	519,937	317,998	484,001	1.52	61
Upper Monongahela.	23	a 1,449	30	319,590	183,430	194,277	1.06	57
Upper Potomac	2	622	0	379,227	230,150	329,371	1.43	60.7
Total	87	8,659	161	3,145,398	1,925,071	2,432,657	1.26	61.2

a Includes 60 Semet-Solvay ovens.

Production of coke in West Virginia in 1897, by districts.

District.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke produced.	Aver- age price of coke per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per ct.</i>
Flat Top	36	4,648	18	1,172,206	720,988	\$868,484	\$1.20	61.5
Kanawha	7	576	20	199,312	117,849	187,350	1.59	59.1
New River	17	1,225	0	439,103	268,263	419,151	1.56	61.1
Upper Monongahela.	22	1,363	0	289,678	175,165	180,802	1.03	60.5
Upper Potomac	2	592	0	312,984	190,401	278,012	1.46	60.3
Total	84	8,404	38	2,413,283	1,472,666	1,933,808	1.31	61

Pocahontas-Flat Top district.—Next to the Connellsville district, this is the most important coking region in the United States. Outside of Pennsylvania and Alabama, it produces more coke than any

other single State and nearly as much as any two. Like the Connells-ville region, it produces a typical blast-furnace coke, and as a steam coal the coal used has only one rival—the Clearfield coal of Pennsylvania. Flat Top coke is chemically superior to Connellsville, as it is lower in ash, and is regarded by some ironmasters as the equal in physical properties to Connellsville coke. The production of coke in the district in 1899 amounted to 1,138,389 short tons, an increase of 80,763 tons over that of 1898, up to that time the largest in its history, which dates from 1886. There was a decrease of 1 in the number of establishments and of 44 in the number of ovens in the district, but there were 214 new ovens in course of construction at the close of the year. In addition to the 44 ovens abandoned, 419 others were idle, which will account for the comparatively small increase in production in 1899. All of the ovens in the district were operated in 1898.

The statistics of production in the district from its beginning in 1886 are exhibited in the following table:

Statistics of the manufacture of coke in the Flat Top district of West Virginia from 1886 to 1899.

Year.	Estab-lish-ments.	Ovens.		Coal used.	Coke pro-duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build-ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1886...	2	10	38	1,075	658	\$1,316	\$2.00	61.2
1887...	5	348	642	76,274	51,071	100,738	1.97	67
1888...	13	882	200	164,818	103,947	183,938	1.77	63
1889...	16	1,433	431	387,533	240,386	405,635	1.69	64
1890...	17	1,584	252	566,118	325,576	571,239	1.75	57.5
1891...	19	1,889	358	537,847	312,421	545,367	1.70	58
1892...	30	2,848	933	595,734	353,696	596,911	1.69	59.3
1893...	34	4,349	80	746,051	451,503	713,261	1.58	60.5
1894...	36	4,648	18	1,229,136	746,762	989,876	1.325	60.7
1895...	36	4,648	18	858,913	524,252	656,494	1.25	61
1896...	36	4,648	18	1,400,369	852,120	1,100,312	1.291	60.8
1897...	36	4,648	18	1,172,206	720,988	868,484	1.20	61.5
1898...	36	4,667	27	1,701,404	1,057,626	1,216,059	1.15	62.2
1899...	35	4,623	214	1,861,570	1,138,389	1,453,601	1.28	61.1

New River district.—This district is second in importance to the Flat Top and adjoins it on the west. It includes the ovens along the Chesapeake and Ohio Railroad from Quinnimont to Nuttallburg. The coal makes an excellent coke, which is in good demand, its market being

chiefly east of the mountains. The coke made at Lowmoor, Virginia, really belongs to this district, as the coal is drawn from it.

There was a decrease of 36,864 tons in the production for 1899, and this, taken in connection with the increased production of the two districts in the northern part of the State, reduces it from second to fourth place among the coke-producing districts of the State. The decrease in 1899 may be considered a temporary check only, as there were four new establishments started in 1899, 145 new ovens were completed during the year, and 167 were in course of construction on December 31. There were 151 ovens idle in 1899, against 130 in 1898.

The statistics of the manufacture of coke in the New River district from 1880 to 1899 are as follows:

Statistics of the manufacture of coke in the New River district, West Virginia, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	6	468	40	159,032	98,427	\$239,977	\$2.14	62
1881.....	6	499	0	219,446	136,423	334,652	2.45	62
1882.....	6	518	0	233,361	148,373	352,415	2.38	64
1883.....	6	546	0	264,171	167,795	384,552	2.29	64
1884.....	8	547	12	219,839	135,335	274,988	2.03	62
1885.....	8	519	0	244,769	156,007	325,001	2.08	63.8
1886.....	8	513	5	203,621	127,006	281,778	2.22	62
1887.....	11	518	50	253,373	159,836	401,164	2.51	63
1888.....	12	743	0	334,695	199,831	390,182	1.95	60
1889.....	12	773	0	268,185	157,186	351,132	2.23	58.6
1890.....	12	773	4	275,458	174,295	377,847	2.17	63
1891.....	13	787	102	309,073	193,711	426,630	2.20	63
1892.....	14	965	0	315,511	196,359	429,376	2.19	62
1893.....	13	947	10	281,600	178,049	355,965	2.00	63
1894.....	14	1,089	0	222,900	140,842	245,154	1.74	63.2
1895.....	14	978	0	385,899	244,815	404,978	1.65	63.4
1896.....	17	1,259	0	425,219	269,372	443,072	1.64	63.3
1897.....	17	1,225	0	439,103	268,263	419,151	1.56	61.1
1898.....	18	1,299	4	519,937	317,998	484,001	1.52	61
1899.....	22	1,444	167	503,160	281,134	533,996	1.90	56

Kanawha district.—The Kanawha district includes all the ovens along the Kanawha River from its formation by the junction of the New and Gauley rivers at Gauley to the western limit of the coal

fields. There are 8 establishments in the district, with a total of 653 ovens, all but 12 of which were operated during the year. The production in 1899 was the largest in the history of the district, exceeding that of 1895, the year of previous maximum production, by over 25,000 tons. Compared with 1898 the production in 1899 exhibits an increase of 54,470 tons.

The statistics of the manufacture of coke in the Kanawha district from 1880 to 1899 are as follows:

Statistics of the manufacture of coke in the Kanawha district, West Virginia, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880.....	4	18	0	6,789	4,300	\$9,890	\$2.30	63.3
1881.....	4	18	0	11,516	6,900	16,905	2.45	60
1882.....	5	a 138	0	40,782	26,170	62,808	2.40	64
1883.....	5	a 147	0	58,735	37,970	88,090	2.32	64.6
1884.....	6	a 177	15	60,281	39,000	76,070	1.95	64.6
1885.....	7	b 181	63	65,348	37,551	63,082	1.68	57
1886.....	7	302	170	89,410	54,329	117,649	2.17	60.7
1887.....	7	548	0	153,784	96,721	201,418	2.08	63
1888.....	9	572	8	141,641	84,052	146,837	1.75	59
1889.....	6	474	0	109,466	63,678	117,340	1.84	58
1890.....	6	474	0	182,340	104,076	196,583	1.89	57
1891.....	6	474	0	241,427	134,715	276,420	2.05	56
1892.....	6	506	0	242,627	140,641	284,174	2.02	58
1893.....	6	506	0	215,108	122,241	237,308	1.94	56.8
1894.....	6	506	0	176,746	104,160	181,586	1.74	58.9
1895.....	6	506	0	267,520	164,729	270,879	1.64	61.6
1896.....	7	576	10	259,715	157,741	263,210	1.67	60.7
1897.....	7	576	20	199,312	117,849	187,359	1.59	59.1
1898.....	8	622	100	225,240	135,867	208,949	1.538	60
1899.....	8	653	88	323,506	190,337	364,148	1.91	58.8

a Eighty of these ovens are Coppée, the balance beehive.

b Sixty of these ovens are Coppée, the balance beehive.

Upper Potomac district.—In the Upper Potomac district are included the ovens along the line of the West Virginia Central and Pittsburg Railway, running south from near Cumberland, Maryland. This district has been thoroughly described, not only in previous volumes of Mineral Resources, but also in a separate publication by the Survey.

With one exception the coke production of this district has increased

each year since it began in 1887. The product in 1899 was nearly three times that of 1895, a year of exceptional activity in coke production. All of the ovens in this district made coke in 1899, as they did in 1898.

Statistics of the production of coke in the Upper Potomac district of West Virginia are as follows:

Statistics of the manufacture of coke in the Upper Potomac district of West Virginia from 1887 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				Short tons.	Short tons.			Per cent.
1887.....	1	20	50	3,565	2,211	\$4,422	\$2.00	62
1888.....	1	28	0	9,176	5,835	8,752	1.50	64
1889.....	2	84	0	26,105	17,945	28,559	1.58	69
1890.....	2	178	28	94,983	61,971	118,503	1.91	65
1891.....	2	390	39	111,014	76,599	133,549	1.75	69
1892.....	3	395	0	114,045	78,691	121,208	1.54	69
1893.....	3	394	0	123,492	84,607	115,250	1.36	68.5
1894.....	2	394	0	66,598	43,546	43,546	1.00	65.4
1895.....	2	442	0	183,187	110,753	126,595	1.14	60.5
1896.....	2	482	0	270,275	164,093	242,133	1.476	60.7
1897.....	2	592	0	312,984	190,401	278,012	1.46	60.8
1898.....	2	622	0	379,227	230,150	329,371	1.43	60.7
1899.....	3	673	90	506,793	305,845	532,358	1.74	60.3

Upper Monongahela district.—The Upper Monongahela district includes the ovens in the group of counties lying along the line of the Baltimore and Ohio Railroad, near the headwaters of the Monongahela River—Preston, Taylor, Harrison, and Marion counties. It embraces the Clarksburg and Fairmont mining regions, in which some of the most important developments in the State have been made during the last few years. The production of coke in this district in 1899 showed an increase of nearly 100 per cent over 1898, and reached a total of 362,872 short tons, making this district the second in importance in the State. This was accomplished in spite of a reduction from 23 to 19 in the number of establishments, and of the fact that 458 out of 1,453 ovens in the district were idle, as compared with 400 idle ovens out of a total of 1,449 in 1898. The production of this district includes the output from the bank of 60 Semet-Solvay ovens at Wheeling. These ovens were put in blast in December, 1898.

The statistics of coke production in the Upper Monongahela district since 1880 are shown in the following table:

Statistics of the manufacture of coke in the Upper Monongahela district, West Virginia, from 1880 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1880	8	145	0	64,937	36,028	\$68,930	\$1.91	55
1881	9	172	0	73,863	43,803	78,014	1.78	59
1882	11	222	0	92,510	55,855	105,214	1.88	60
1883	13	269	0	88,253	51,754	90,848	1.76	59
1884	13	281	100	78,468	49,139	74,894	1.52	63
1885	12	278	0	105,416	67,013	97,505	1.45	63.5
1886	12	275	104	131,896	82,165	113,100	1.38	62.3
1887	15	646	0	211,330	132,192	268,990	2.03	62.5
1888	17	567	110	213,377	138,097	175,840	1.27	64.7
1889	17	674	200	210,083	128,685	171,511	1.33	62.5
1890	18	1,051	50	276,367	167,459	260,574	1.56	60
1891	15	1,081	56	517,615	291,605	462,677	1.58	56
1892	19	1,129	45	441,266	265,363	390,296	1.47	60.1
1893	19	1,158	42	379,506	225,676	295,123	1.31	59
1894	20	1,221	42	280,748	158,623	179,525	1.13	56.5
1895	20	1,260	37	392,297	240,657	265,293	1.10	61.3
1896	22	1,386	0	331,526	206,429	211,272	1.023	62.3
1897	22	1,363	0	289,678	175,165	180,802	1.03	60.5
1898	23	^a 1,449	30	319,590	183,430	194,277	1.06	57
1899	19	^a 1,453	^b 60	607,796	362,872	596,305	1.64	59.7

^a Includes 60 Semet-Solvay ovens at Wheeling.

^b All Semet-Solvay ovens at Wheeling.

WISCONSIN.

All the coke made in Wisconsin is from Connellsville (Pennsylvania) coal, and the coke is standard Connellsville. Its production, therefore, is not of much interest, except as showing that coal can be carried to a distance and successfully made into coke.

The statistics of the manufacture of coke in Wisconsin from 1888 to 1899, inclusive, are as follows:

Statistics of the manufacture of coke in Wisconsin.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1888.....	1	50	.....	1,000	500	\$1,500	\$3.00	50
1889.....	1	50	.....	25,616	16,016	92,092	5.75	62.5
1890.....	1	70	.....	38,425	24,976	143,612	5.75	65
1891.....	1	120	0	52,904	34,387	192,804	5.61	65
1892.....	1	120	0	54,300	33,800	185,900	5.50	62.2
1893.....	1	120	0	24,085	14,958	95,851	6.41	62
1894.....	1	120	0	6,343	4,250	19,465	4.58	67
1895.....	1	120	0	8,287	4,972	26,103	5.25	60
1896.....	1	120	0	8,648	5,332	21,000	3.94	62
1897.....	1	120	0	29,207	17,216	75,000	4.36	59
1898.....	1	120	0	59,900	35,280	123,480	3.50	59
1899.....	1	120	0	54,950	33,437	125,389	3.75	60.8

The character of the coal used in the manufacture of coke in Wisconsin since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Wisconsin since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	38,425	0	0	0	38,425
1891.....	52,904	0	0	0	52,904
1892.....	54,300	0	0	0	54,300
1893.....	20,474	0	3,611	0	24,085
1894.....	6,343	0	0	0	6,343
1895.....	8,287	0	0	0	8,287
1896.....	0	0	5,183	3,465	8,648
1897.....	0	0	0	29,207	29,207
1898.....	0	0	0	59,900	59,900
1899.....	34,680	0	20,270	0	54,950

WYOMING.

There is but one establishment making coke in Wyoming, that of the Cambria Mining Company, located at Cambria, Weston County. This establishment began the manufacture of coke in 1891, but produced no coke in 1892. Manufacture was resumed in 1893 and increased each year until 1898, when it decreased about 25 per cent. A further decrease of 15 per cent is shown in the figures for 1899.

All of the coal used in coking is unwashed slack, which does not give as good a result as washed slack. When the latter is used the coke is of fine texture and very strong. It is dense and capable of sustaining any weight ordinarily required of coke used, as this is, in silver smelting. As at present produced, however, the coke is very high in ash.

The statistics of the production of coke in Wyoming from 1891 to 1899, inclusive, are as follows:

Statistics of the production of coke in Wyoming from 1891 to 1899.

Year.	Estab- lish- ments.	Ovens.		Coal used.	Coke pro- duced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Build- ing.					
				<i>Short tons.</i>	<i>Short tons.</i>			<i>Per cent.</i>
1891.....	1	24	0	4,470	2,682	\$8,046	\$3.00	60
1892.....	1	24	0	0	0	0	0	0
1893.....	1	24	0	5,400	2,916	10,206	3.50	54
1894.....	1	24	0	8,685	4,352	15,232	3.50	50
1895.....	1	74	0	10,240	4,895	17,133	3.50	47.8
1896.....	1	74	0	41,038	19,542	58,626	3.00	47.6
1897.....	1	74	0	54,976	24,007	72,021	3.00	43.7
1898.....	1	74	0	35,384	18,350	64,225	3.50	51.9
1899.....	1	74	0	32,100	15,630	38,510	2.46	48.7

The character of the coal used in the manufacture of coke in Wyoming is shown in the following table:

Character of coal used in the manufacture of coke in Wyoming since 1891.

Year	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1891.....	0	0	4, 470	0	4, 470
1892.....	0	0	0	0	0
1893.....	0	0	5, 400	0	5, 400
1894.....	0	0	8, 685	0	8, 685
1895.....	0	0	10, 240	0	10, 240
1896.....	0	0	41, 038	0	41, 038
1897.....	0	0	54, 976	0	54, 976
1898.....	0	0	35, 384	0	35, 384
1899.....	0	0	32, 100	0	32, 100

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